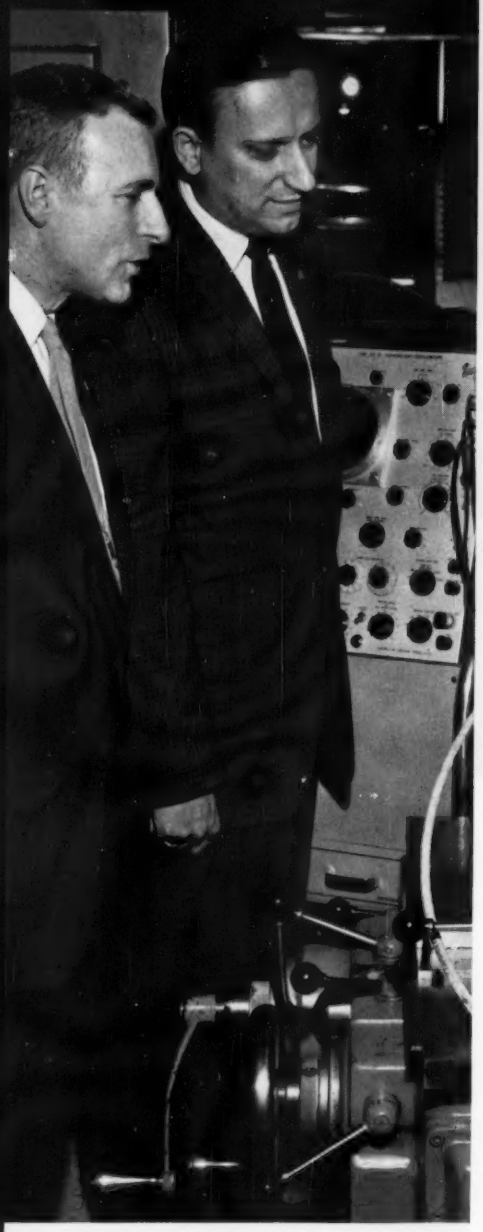
STEEL

The

Metalworking Weekly

JUNE 20, 1960

A PENTON PUBLICATION



'Hot Machining Can Tame Tough Alloys'

So says Dr. M. Eugene Merchant (left) director, Physical Research Dept., Cincinnati Milling Machine Co. He and E. J. Krabacher (right) senior research supervisor, headed a three year program that proves the technique has a "promising potential" in machining some of the high strength, heat resistant steel alloys. For the results of their work—see Page 106.

What's Happening in Youngstown?

'Computer Gives Us the Best Design In Shortest Time,' Says Motormaker

Steelmakers Ready New Enameling Sheets for Commercial Production

How It Pays Off

No. 13 in STEEL's Program for Management

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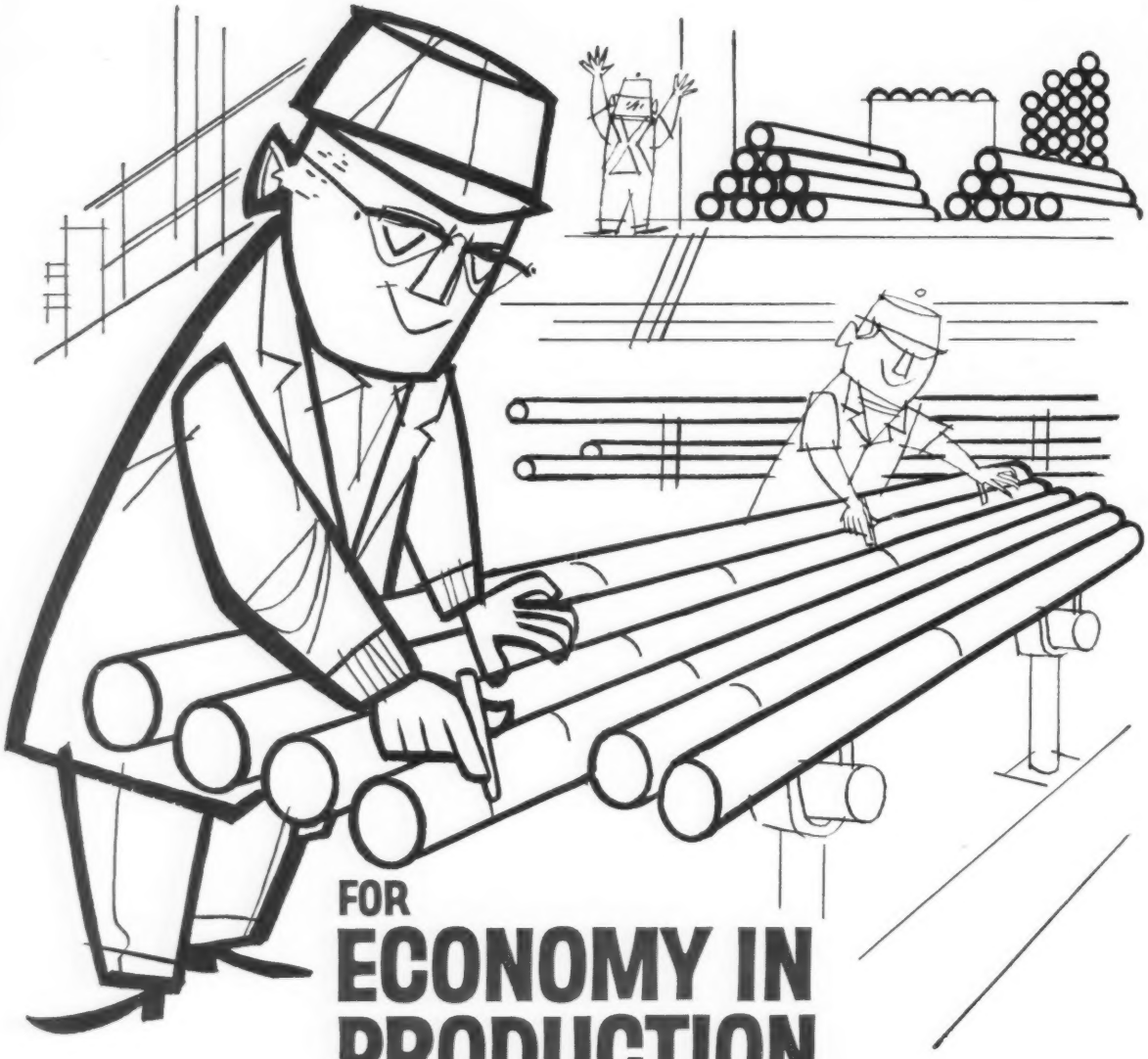

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And quality control is just one of the many reasons why it pays to specify B&W Job-Matched Tubing. And — matching tubes to jobs assures you the right tube, in the right quantity at the right time. For more information, call your local B&W District Sales Office or write for Bulletin TB-420. Remember, too, B&W Job-Matched Tubes are handled by Steel Service Centers all about the country. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pennsylvania.

Steel

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Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

This Week in STEEL

The Metalworking Weekly

June 20, 1960 Vol. 146 No. 25

What's Happening in Youngstown?

That was the question the nation asked when Youngstown's steel operating rate recently plummeted to 27 per cent of capacity. Steelmaking, the area's dominant industry, has some major competitive obstacles to hurdle. Those and other problems faced by the Youngstown area are paralleled in other industrial communities. Here are the factors contributing to the problem and what industrial, civic, and labor leaders feel lies ahead. PAGE 63

How an Industry Is Helping Itself

Producers of welded steel wire fabric are combating imports and overcapacity and waging a new campaign to sharpen their technology and production efficiency. PAGE 66

Production Efficiency: How It Pays Off

Reaching optimum production efficiency poses a $20 billion question for U. S. metalworking. The penalty for not meeting the challenge:

1. Employment costs will continue to climb.
2. Inflation will get more severe.
3. Imports will rise, and exports will fall.

PAGE 73

'Computer Gives Us Best Design,' Says Motormaker

That's the opinion of Robbins & Myers Inc., Springfield, Ohio. Says a development engineer: "Instead of slide rules which could produce only a handful of designs for electric motors, engineers now have at their fingertips some 20 million design possibilities which can be reached in a few thousandths of a second." Increased design quality and more efficient engineering time alone may justify a computer purchase, say the experts. Here's how design staff and engineering programers solve problems. PAGE 110

Wanted: New Jobs for Uranium

Depleted uranium from U. S. reactors is becoming available for civilian applications. New uses are anticipated in metalworking, steel, cast iron, and nonferrous metals. PAGE 123

Steelmakers Ready New Enameling Sheet

It's a one-coat, direct on, enameling sheet aimed at filling the needs of appliance makers for a quicker, cheaper method of applying porcelain enamel. Commercial production is getting underway in this new steel market. PAGE 139

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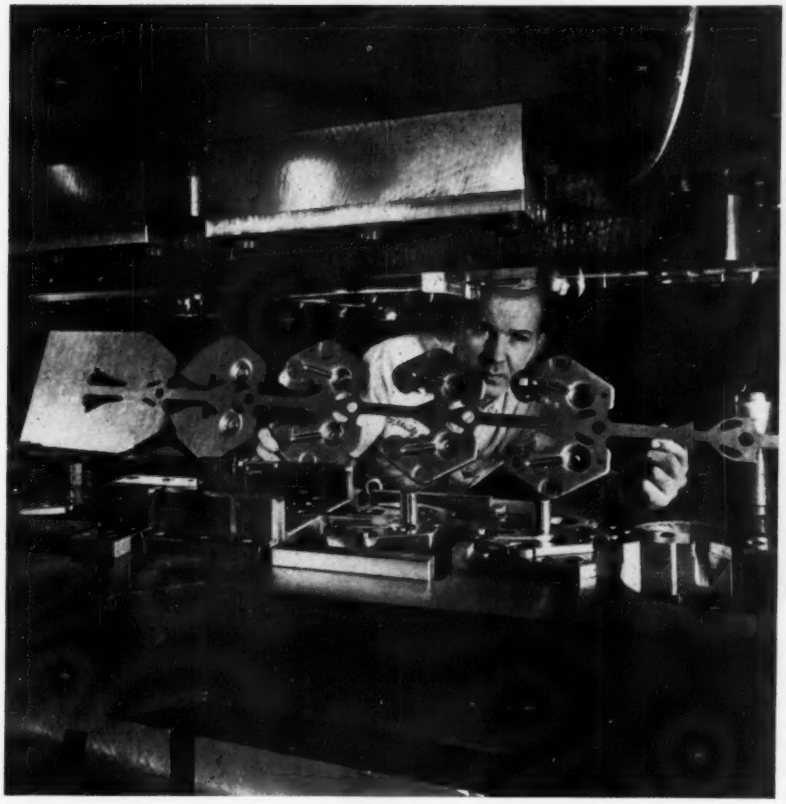
Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation



Another report on Lehigh H tool steel—
"good machinability . . . very low distortion"

7-STAGE DIE FORMS AUTOMOTIVE DECK HINGE PART

This 7-position progressive die of Bethlehem Lehigh H tool steel was made recently by Hillside Tool & Die Company, Roseville, Michigan, for the production of an automotive deck hinge part, from 13-gage sheet steel. The die, made from Lehigh H supplied by our local distributor, Peninsular Steel Co., Detroit, was hardened to Rockwell C 60. It was used in a 400-ton press.

When asked about the performance of the tool steel, a Hillside engineer reported, "We like Lehigh H in jobs of this type because of its good machinability, and its very low distortion during heat-treatment. The die was placed in service with hardly any stoning necessary."

Bethlehem Lehigh H (AISI D-2) is our easy-machining, high-carbon, high-chrome grade of air-hardening tool steel. It has outstanding wear-resistance, due to its excellent carbide distribution.

Your Bethlehem tool steel distributor can give you full details on Lehigh H . . . and he has many sizes in stock.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

Here's how to shrink-fit tool inserts

Shrink-fitting of tool steel inserts, commonly used in improving the service life of tools, is most applicable to rings and cylinders used in heading and drawing operations, where the tools can be shrink-fitted into large retaining rings. The shrink-fit sets up radial compressive stress in the tool. This serves to oppose radial tensile stress set up in service, thereby improving the performance over solid tools which are not pre-stressed.

Here's how to do it:

1. The retainer should have adequate diameter and strength to provide the stresses required on the tool insert. Generally, an alloy steel capable of hardening to 300-400 BHN is used. Shock-resisting tool steels, heat-treated to Rockwell C 48-52, are recommended for heavy-duty applications. The OD of the retainer should be at least twice, and preferably three times, the ID.

2. Allow for a shrink-fit of .003/.004 in. per in. Thus the OD of the insert is .003/.004 in. per in. larger than the ID of the retainer into which it is to fit. These dimensions must be maintained to obtain the benefits of shrink-fitting.

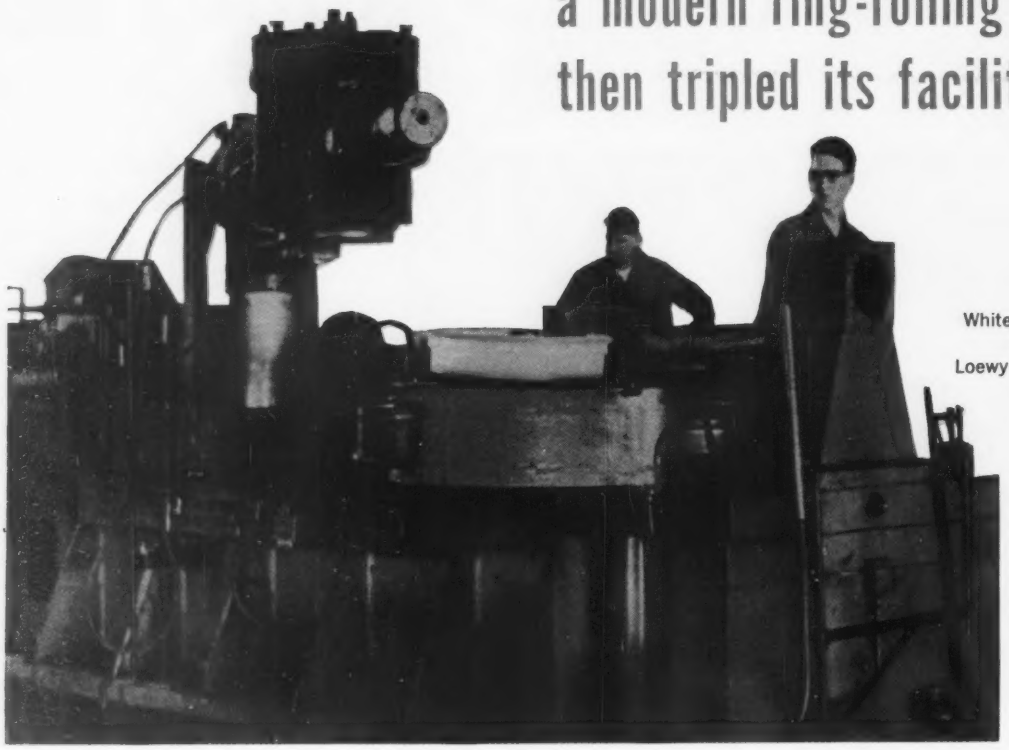
3. It is important that the OD of the insert and the ID of the retainer have a smooth finish, preferably produced by grinding.

4. Heat the retainer to a temperature sufficient to cause the expansion required in assembling the insert. Do not exceed the tempering temperature used in heat-treating the retainer. If necessary, the insert may be sub-zero cooled, to help provide the proper clearance for assembly.

5. After assembly of the parts, the assembly should be cooled rapidly. This will prevent over-tempering of the insert by heat transferred from the retainer.

One good "turn-key" deserves another...

Loewy built and equipped a modern ring-rolling plant, then tripled its facilities



White-hot jet engine ring on a Loewy ring-rolling mill

When the Navy needed rings to a number of unusual specifications for jet planes, a major supplier called upon Loewy-Hydropress to design and build a complete new ring-rolling plant and initiate production. Loewy developed several metal-forming methods, built the basic machinery, designed, constructed and equipped the plant, supplied the complete installation, organized the material flow, and put the plant into operation. Demand for the products quickly exceeded expectations and Loewy was commissioned the following year to triple the size and facilities.

In carrying out what amounted to two "turn-key" jobs, Loewy faced a number of challenging tasks. Navy specifications called for profile rings of alloy steels, stainless steels and titanium up to 72 in. in diameter and 9 in. high. Extruded bar stock and centrifugal castings were to be the basic materials. With these requirements as the goal, Loewy went to work.

Process engineering was confronted with problems not met before, but Loewy metallurgists, together with heat-treating and rolling mill specialists, solved them all, designing the installations to difficult requirements.

It was also Loewy's task to find the best location for the plant. The site chosen, despite its advantages, presented certain physical obstacles, such as streams which had to be diverted or channeled underground. While machinery and auxiliaries were being built, the building and equipment foundations, designed by Loewy, were poured, and the structure rose.

Latest type machinery was then installed for bending, resistance welding, blank heating, annealing, heat treating, ring rolling, expanding, shrinking, shotblasting and machining. Intricate ventilation and fire-protection systems were installed. The most modern quality-control and metallurgical equipment were integrated into the system.

All deadlines were met. Both the initial plant and the vastly expanded facilities went into production on schedule.

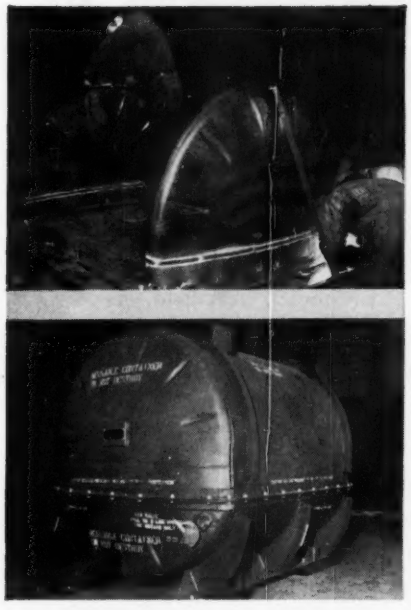
If the swift march of technological progress and the pressure of competition urge you to make new products by new processes—in any industrial facility, large or small—take into account what Loewy can do for you. Contact Dept. B-6.

The initial ring-rolling plant

The expanded plant

BALDWIN · LIMA · HAMILTON
Industrial Equipment Division • Philadelphia 42, Pa.

COMMERCIAL heads up "engine packs"



SMOOTH, ACCURATE FLANGE of COMMERCIAL heads is used as fitting up template and welding fixture in applying shell wrapper. Note embossed ribs giving heads added strength.

COMMERCIAL tank heads are important components of reusable containers fabricated by the New Castle Welding & Mfg. Co. of New Castle, Pa. for storage and shipment of army tank engines.

Built-in "bench marks"— Since containers are pressurized, humidity-controlled, and rugged enough to survive 5-foot free fall with motor weighing 3700 lb. mounted inside, it was imperative for tank heads to fit snugly—integrate smoothly. In fact, the precision uniformity of the flanges of COMMERCIAL heads serve as gauges for fitting the wrapper sheet, speed assembly, make welding easier and faster.

Head details— Engine container heads were custom-made (60" long diameter, 11 gauge QQ-S-640 steel, 1½" straight flange) by COMMERCIAL to rigid specs. COMMERCIAL engineers also designed the embossed ribs on the heads for greater impact resistance. With over 30 years experience and ingenuity in cold forming of steel, COMMERCIAL produces heads with improved metal quality in presses up to 2000-ton capacity. Three plants—Youngstown, Chicago, Salt Lake City—strategically located in important steel producing centers, are keyed to expedite your order.

For fast delivery—COMMERCIAL offers standard heads from stock made with a complete range of solid dies in all standard sizes from 12" to 72" O.D., in all popular gauges up to ½" thickness. Heads can be furnished for code or non-code pressure vessel construction from steels to meet the required specifications. Types furnished include flanged and dished, ellipsoidal, hemispherical, flanged only, double dished and obround. For full information on heads in stock for immediate delivery, write to Commercial Shearing & Stamping Company, Dept. L-26, Youngstown 1, Ohio.

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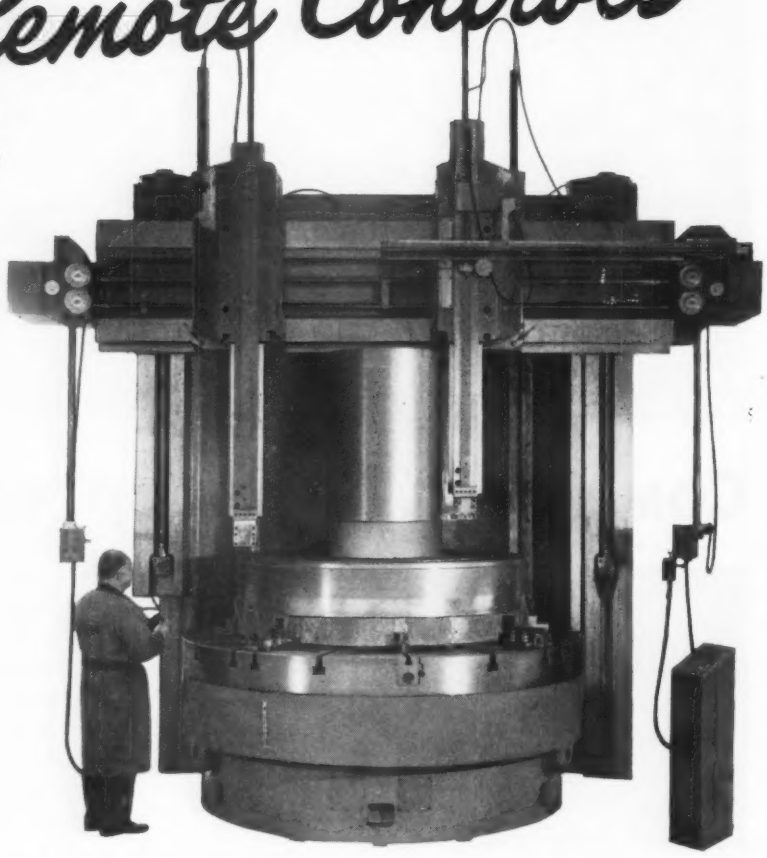
VERTICAL BORING AND TURNING MILLS

FEATURE *Simplified Remote Controls*

Within the span of a man's hand, utilizing a stationary and portable pendant, are all the controls necessary to actuate these modern giant mills. No climbing or clamoring for buttons or levers – every function of the machine is controlled from a position most advantageous to the operator.

The stationary pendant controls feed rate, table speed, starting and stopping of the table – also table jogging.

The portable pendant controls direction of heads in traverse or feed for either horizontal, vertical or 45° travel.

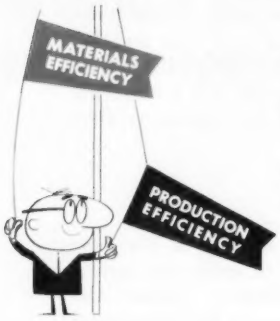


108" Dynatrol Vertical Boring and Turning Mill
Capacity – Maximum swing 120"; Height under rail – 80"; Ram travel – 60"; Table speed ranges, optional, Low 1.4 to 50; Int. 2.1 to 75; High 2.8 to 100; Feed rates infinitely variable from 0-500; available with Plain Table, or 4-jaw independent built in chuck.

This control system, and other revolutionary new Dynatrol features, enable the operator to utilize modern cutting tools at maximum speeds – cut to closer tolerances with superior finish – remove more metal per hour and keep the tool in the cut for more hours per shift. Table diameters of sizes 92, 108, 124 and 144 inches are available. Write or telephone for detailed catalog and complete information. The Bullard Company, Bridgeport 9, Conn., telephone Edison 6-2511.

* Trade Mark

. . . YOU CAN'T BEAT A BULLARD . . .



Editors Change Banners At Midyear

This week, the editors wrap up the first part of our 1960 Program for Management series with article No. 13. It's called "Production Efficiency—How It Pays Off," and you'll find its four pages jam packed with examples that show how good, regular equipment buying pays.

So far, the series has drawn 608 requests for reprints—some 400 of them request the entire series.

On July Fourth, the editors will haul on the halyard to run up another ensign of efficiency—this one signals a 13-part series on materials. It's a close companion to the Production Efficiency series and deals with cost cutting potentials. Materials account for an average of one-half of a company's costs, which makes for enormous possibilities.

The three editors who are teamed on the series, John Morgan, Ed Case, and George Howick (backed up by others who will participate on a spot basis) are investigating and writing about a number of topics, including design, standardization, improved reliability, plugging scrap losses, co-operation with suppliers of materials, and better management of materials.

In explaining the background of the series, Associate Managing Editor John Morgan says: "Companies need luck to hold the wage line; inflation is continuing; foreign competition is severe—those, and other factors, call for drastic cost cutting. This new series, coupled with the production efficiency set, lays out many of the steps to be taken."

On Making a Forecast

With extensive coverage given to weather forecasts via TV, radio, and newspapers, errors are bound to crop up in reporting. For example, a radio announcer intones: "There ought to be good weather for the baseball game today" . . . and you find out it's raining at the stadium. Causes a guy to wonder if the announcer neglected to look out the window.

Which leads us to a STEEL forecast, sans errors. During the last six months, you've read opinions on the economic weather—courtesy of our panel of economists, person to person reports filed by our editors on a coast to coast air safari, and many studies of companies and industries. Result: The sixties (and 1960) are worrisome, whether sagging, soaring, or static.

Next week, STEEL's editors will present a solid statistical evaluation of what's going to happen in metalworking during the second half of 1960. The article is billed as the "Midyear Forecast of Business Expectations." It's based on the opinions of men who should know the most about what's ahead—6100 general managers of metalworking plants. It will cover production, prices, costs, profits, expansion, problems, and a host of other points. One thing we can say: The managers are confident—for the details, see next week's issue.

New on the STEEL Staff . . .

. . . is Reed Trask, who carries the title of assistant editor. After he was graduated from Ohio State University in 1952 with an AB degree, Reed joined the *Cleveland Plain Dealer* as a reporter and rewrite man. During 4½ years there, he wrote innumerable stories on labor, business, and finance. Among the more lurid stories he helped cover was the case of Dr. Samuel Sheppard. It broke on a murky July 3, 1954, when the doctor's wife was found murdered. Reed stuck with the case until Dr. Sheppard was jailed, charged (and later convicted) with the murder.

In the last 3½ years, Reed has been writing for

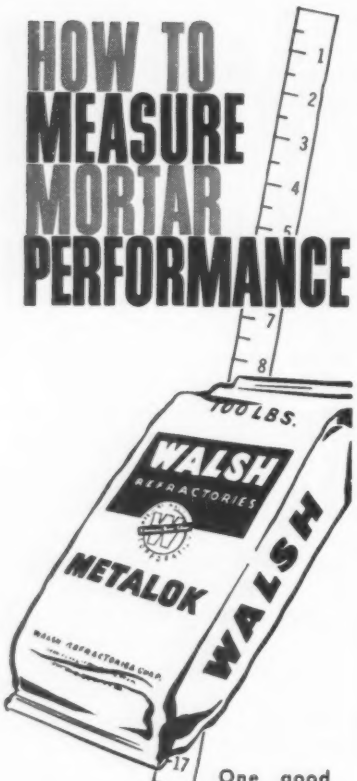
I believe _____ automobiles will be produced in the U. S. from Jan. 1 through Dec. 31, 1960.

Mail this to:
Ed Service
Beat-the-Experts
STEEL
1213 W. 3rd St.
Cleveland 13,
Ohio

PRINT NAME _____
POSITION _____
COMPANY _____
ADDRESS _____
CITY _____
STATE _____

Entries must be postmarked before midnight, June 30.

HOW TO MEASURE MORTAR PERFORMANCE



One good way to judge the performance of a refractory mortar is to subject it to an extra-tough assignment. Apply this yardstick of measurement to Metalok and you will have the answer to the problem of joint erosion in ladle and fire brick linings. Metalok has proven in countless installations that it successfully resists heavily laden iron oxide slags for record highs in ladle lining life. Metalok will more than measure up to your expectations in steel mill applications.

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the Public Information Dept., Cleveland Electric Illuminating Co. His specialties: News releases on technical and financial aspects of the utility's business as well as socioeconomic reports.

On STEEL, Reed is developing stories in the news and special projects sections. After hours he relaxes with his wife and two sons and follows the battles of the Cleveland Indians. He also knows his way around the golf course, but says he has more miles on his typewriter than on fairways.

Beating the Deadline

There are only a few more days left to enter our current Beat-the-Experts contest. Use the coupon in this department to send in your estimate of the number of automobiles that will be produced in the U. S. during calendar 1960. The winner will get two weeks' free use of any Ford Div. car. Five next best guessers will win full color prints of a dream car rendered and signed by Virgil M. Exner, Chrysler Corp. vice president and director of styling.

Our art editors, Tom Bryan and Tom Welsh, scrutinized the prints and adjudged them among the finest they've ever seen. Winners will be named in January, 1961, when *Ward's Automotive Reports* announces autodom's preliminary production figures.

Remember, it's not how you play the game, it's whether you win or lose that counts. Better clip your coupon today.

You Can Win $1000 This Month

There are four issues of STEEL this month—and one could help you win $1000 in our Usership Idea of the Month Contest.

Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—June, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—you will win $500.

There's more . . . You will win an additional $500 if you furnish written proof that you accomplished your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month Award.

You can enter as many times as you wish. Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property.

Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. Deadline for this month's contest is Aug. 1.

Versatility and quicker setups cut grinding costs for toolrooms and short run production

MMT PE

LANDIS

precision grinders

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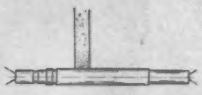
Landis 10" x 20" and 10" x 24" Universal Cylindrical Grinders feature Microsphere Wheel Spindle Bearings for maximum accuracy, high finishes and dependable operation.

Grinding jobs which can be done on this machine



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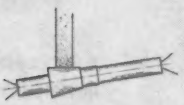

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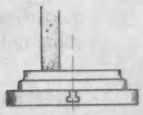
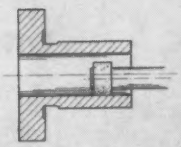


face and angle



internal—straight and angle

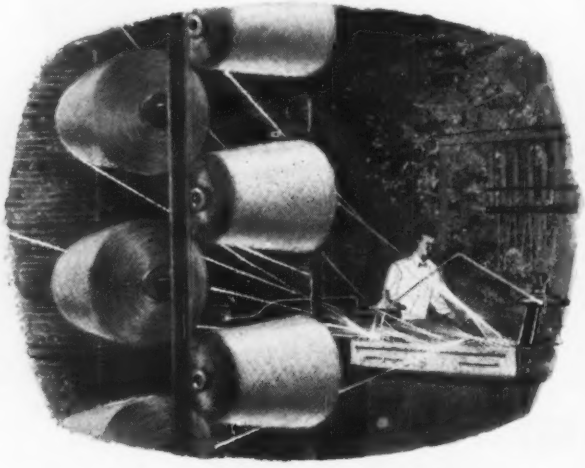
GOODYEAR

EVOLUTION OF

IT ALL STARTED when Leonardo da Vinci invented the belt drive for his polishing wheel. Spurred on by the drive's many advantages, engineers have striven for a more effective method of indirect power transmission ever since.

THE NEXT MAJOR DEVELOPMENT, although then seemingly unrelated, was the discovery of the vulcanization of rubber in 1839. Charles Goodyear not only fathered a multibillion-dollar industry, but also helped pave the way to much more efficient power transmission.

ANOTHER MAJOR BREAKTHROUGH came in 1941, when Goodyear introduced the first practical Steel Cable V-Belt for use on Army tanks. Here was the strongest, most efficient, most heat- and stretch-resistant belt ever built. A wartime success, steel cable is used in belts handling today's toughest industrial drives.

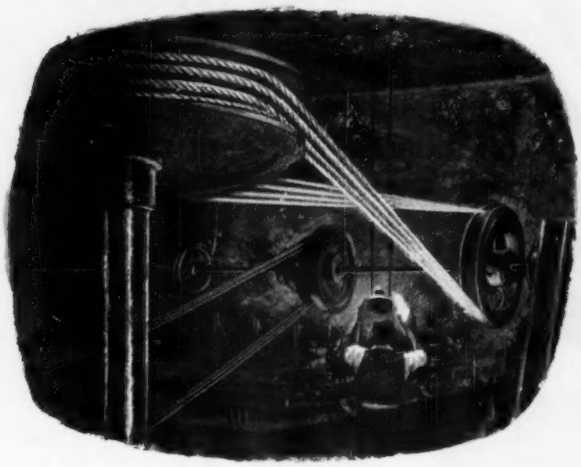


THEN CAME THE "MIRACLE" FIBERS and super-rated V-belts. Again Goodyear was in the fore with the HY-T V-Belt—a strong, shock-resistant belt that answered most multiple drive problems. But V-belt makers still sought a more effective way to overcome stretch and shrinkage.

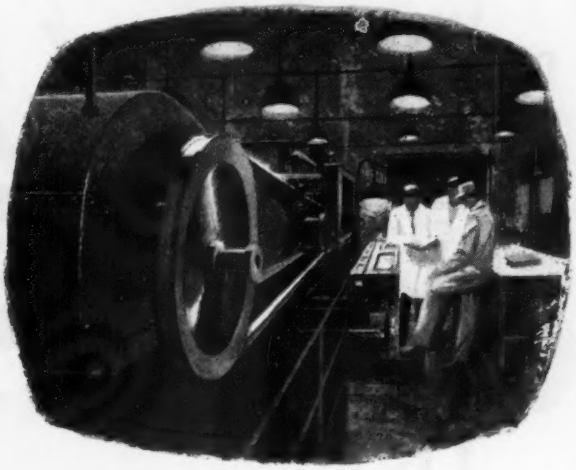
For maximum, trouble-free horsepower hours on any V-belt drive, insist on the top belt from the top beltmaker.

Lots of good things come from GOOD

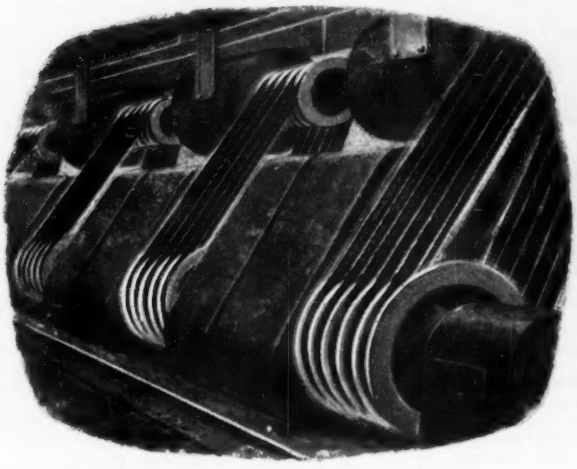
A REVOLUTION



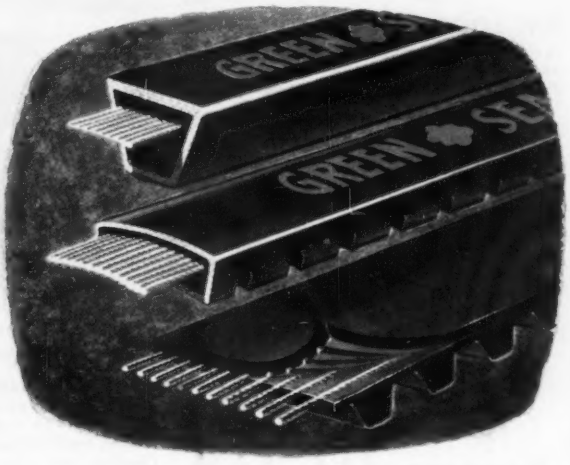
OVER A DECADE PASSED BEFORE a man named Combe introduced two new ideas in the transmission of power—teams of load-carriers and "wedge-in" action. His first multiple rope drive was not very efficient or durable, but started a whole new trend in development.



IT TOOK A LITTLE TIME before the first rubberized V-belts were introduced. Many of the earliest improvements were developed by Goodyear scientists. The greater efficiency of the V-belt soon placed it on many drives, despite shortcomings in length stability and strength.



GOODYEAR SOLVED THE PROBLEM with the 3-T Process to take surplus shrinkage and stretch out of synthetic cord. That development made possible multiple drive V-belts with true dimensional stability—Green Seal V-Belts by Goodyear that stayed matched on the drive or in storage.



A REVOLUTION IN POWER TRANSMISSION was launched by the complete line of V-belts with the Green Seal—Compass-V-Steel, HY-T, E-C Cord, and the compact new HY-T WEDGE. With P. D. (positive drive) and Variable Speed Belts, they combine to offer Goodyear belts of unsurpassed quality for every need.

See your Goodyear Distributor or write: Goodyear, Industrial Products Division, Lincoln 2, Nebraska, or Akron 16, Ohio.

YEAR THE GREATEST NAME IN RUBBER

HY-T, Green Seal, E-C, Compass, P.D.-T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

Practical Idea for the Production Man

Efficient electric hoists...to move materials overhead and release floor space for more valuable operations.

CM HOISTS

CM LODESTAR ELECTRIC CHAIN HOIST
⅛ to 2 ton capacities—First truly heavy duty version of small electric hoist. ⅛ ton model weighs only 51 lbs. Heavy duty self-adjusting brake. Upper-lower safety limit switches. CM-Alloy load chain.

CM METEOR ELECTRIC WIRE ROPE HOIST
½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

Good Suggestion for the Maintenance Man!

Rugged lightweight hand hoists and pullers...to make your job easier and safer

CM CYCLONE HAND HOIST
⅛ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER THE "ONE MAN GANG"
¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation. Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds. CM-Alloy flexible load chain.

ALSO... *CM Trolleys and Cranes*

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CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CHAIN CORPORATION
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REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND

In Canada: McKINNON COLUMBUS CHAIN LIMITED, ST. CATHARINES, ONTARIO

CALENDAR
OF MEETINGS

June 26-29, Drop Forging Association: Annual meeting, Seignory Club, Papineau County, Quebec. Association's address: 55 Public Square, Cleveland 13, Ohio. Executive vice president: Dwight M. Allgood.

June 26-30, Caster & Floor Truck Manufacturers Association: Semiannual meeting, Equinox House, Manchester, Vt. Association's address: 27 E. Monroe St., Chicago 3, Ill. Executive secretary: Harry P. Dolan.

June 26-July 1, American Society for Testing Materials: Annual meeting and exhibit, Chalfonte-Haddon Hall, Atlantic City, N. J. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Robert J. Painter.

July 2-6, National Tool & Die Manufacturers Association: Summer meeting, Banff Springs Hotel, Banff, Alta. Association's address: 907 Public Square Bldg., Cleveland 13, Ohio. Executive vice president: George S. Eaton.

July 10-13, Truck-Trailer Manufacturers Association: Summer meeting, Homestead Hotel, Hot Springs, Va. Association's address: 710 Albee Bldg., Washington 5, D. C. Managing director: John B. Hulse.

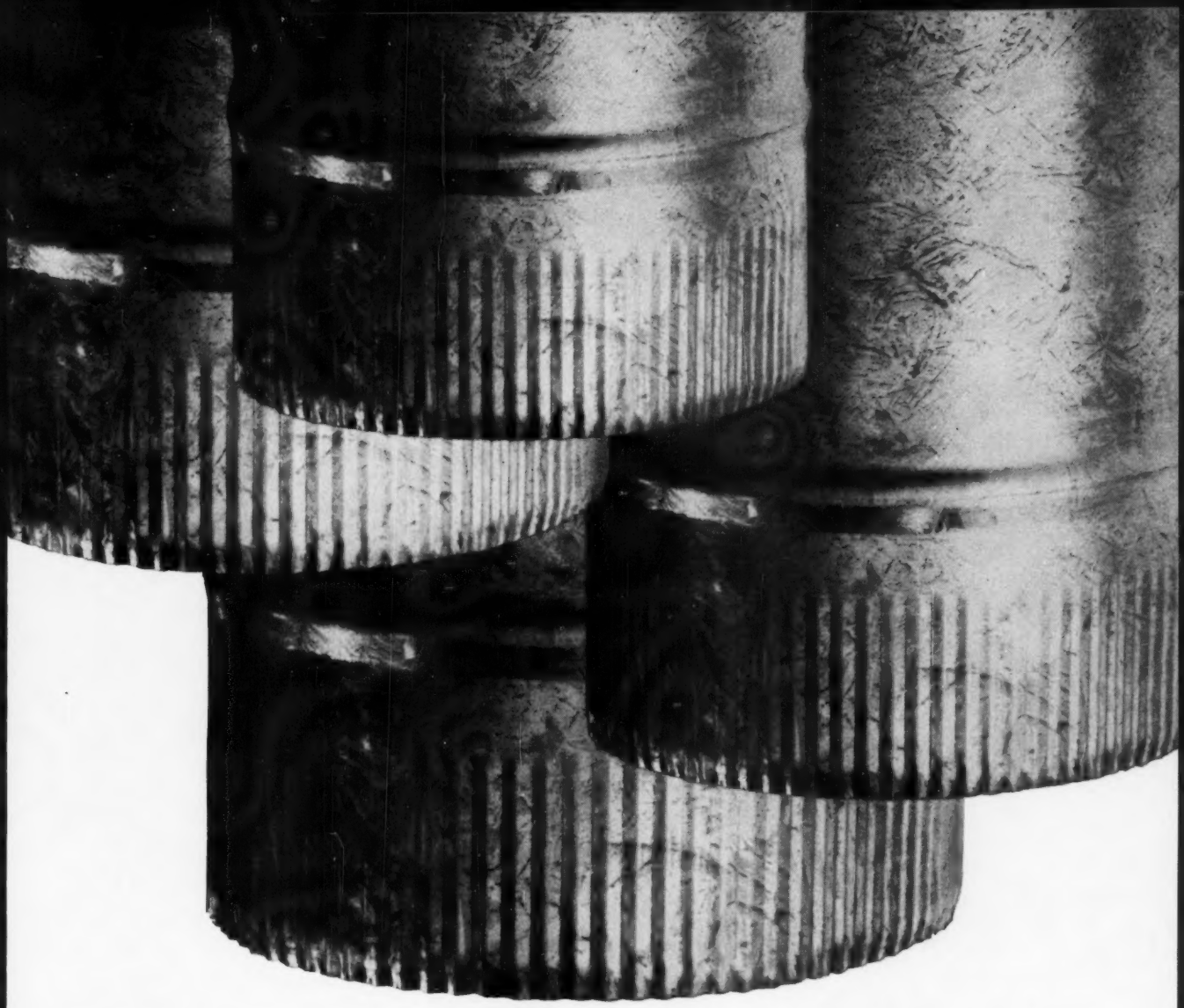
July 11-12, Metallurgical Society of AIME: Conference on response of materials to high velocity deformation, Estes Park, Colo. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

July 22-24, National Association of Metal Finishers: Annual meeting, Statler-Hilton Hotel, Los Angeles. Association's address: 60 Bently Rd., Cedar Grove, N. J. Executive director: P. Peter Kovatis.

July 24-28, American Electroplaters Society: Annual meeting, Statler-Hilton Hotel, Los Angeles. Society's address: 445 Broad St., Newark 2, N. J. Executive secretary: John P. Nichols.

Aug. 8-12, American Institute of Electrical Engineers: Pacific general meeting, U. S. Grant Hotel, San Diego, Calif. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

Aug. 15-17, American Society of Mechanical Engineers and American Institute of Chemical Engineers: Heat transfer conference and exhibit, Statler-Hilton Hotel, Buffalo. Information: ASME, 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.



The more crimping you have to do, the more satisfied you will be with Weirkote Zinc-Coated Steel. There's no peeling, no chipping, no flaking. Work it to the limits of the steel base itself and the zinc coating remains intact assuring you of the complete corrosion protection that only zinc can give. Weirkote is made that way—to retain its protective zinc coating no matter how tough the forming and bending operations. A Weirton representative will gladly supply full information on Weirkote—another fine product of the Weirton Steel Company, Weirton, West Virginia.

WEIRTON STEEL
Weirton, West Virginia

WEIRTON STEEL COMPANY

Weirton Steel is a division of **NATIONAL STEEL CORPORATION**

Weirkote will also be available in 1961 from National's Midwest Steel Division, Portage, Indiana.

The lady is a killer

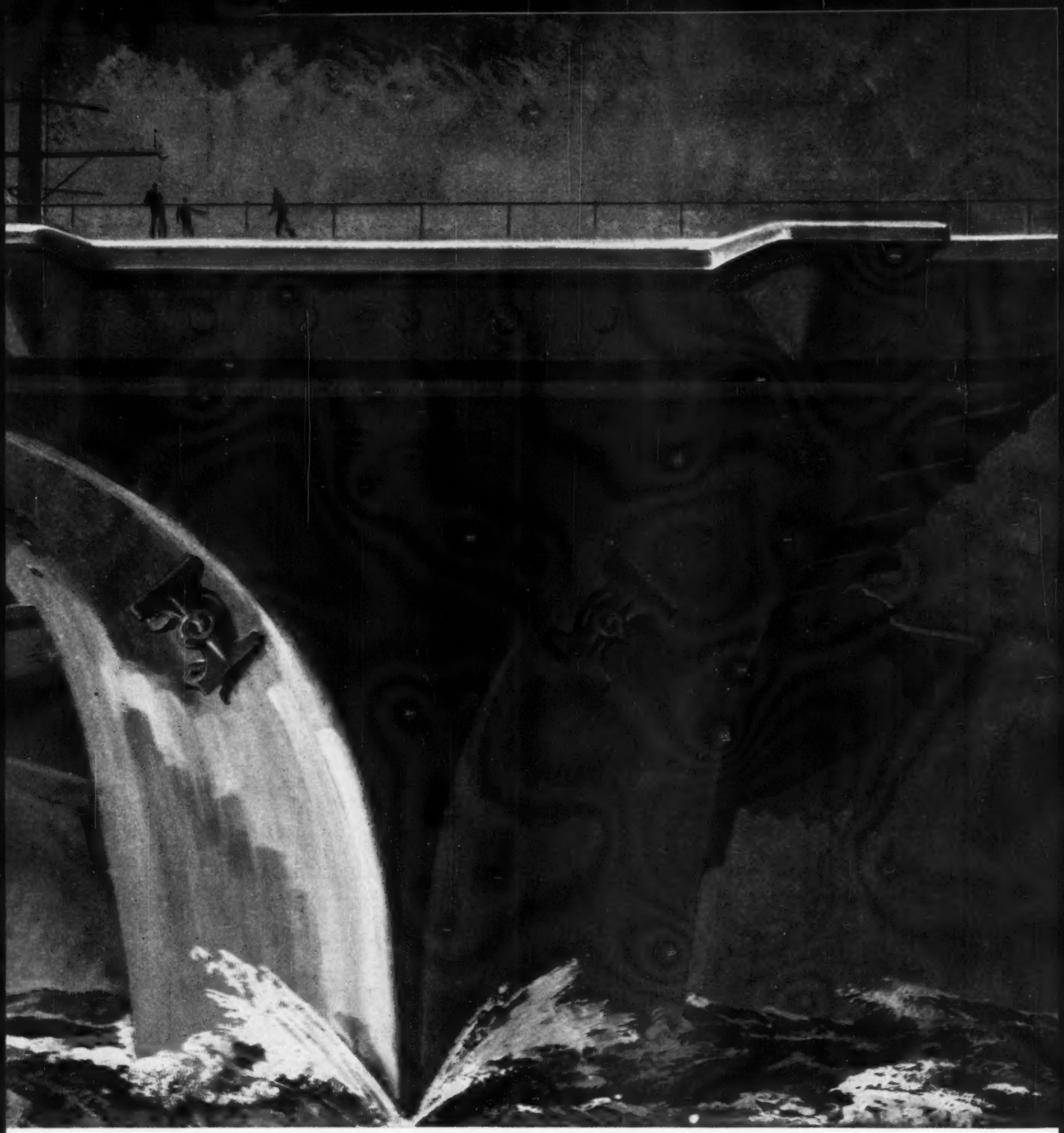
Tough, fast and maneuverable, this is 60,000 tons of fighting ship. She's the Navy's newest and biggest jet-age aircraft carrier—the USS Independence.

This mark tells you a product is made of modern, dependable Steel.

Stowed inside her gargantuan hull are approximately 100 deadly jet fighters. Her armor-plated flight deck stretches 1,000 feet and laps an area of 4 acres. And, she's equipped with four catapults that can snap four jets howling into the air in thirty-eight seconds.

She's fast. The lady easily batters through foam-tipped waves at better than 30 knots. She's maneuverable. The Independence can follow a difficult zig-zag pattern and still cruise a distance of 600 miles in a twenty-four hour period.

To help transmit her great power from eight massive boilers, National Tube supplied over 16,000 feet of USS



National Seamless Pressure Tubes in both carbon and alloy steels for use in steam lines, as well as over 4,000 feet of Standard Pipe. In addition, National Tube also furnished a number of Seamless Steel Cylinders for air actuating systems and recharging breathing units.

For the past 80 years, National Tube has handled tough tubular installations in the fields of line pipe, pressure tubing, mechanical tubing and oil country tubular products. For assistance, write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

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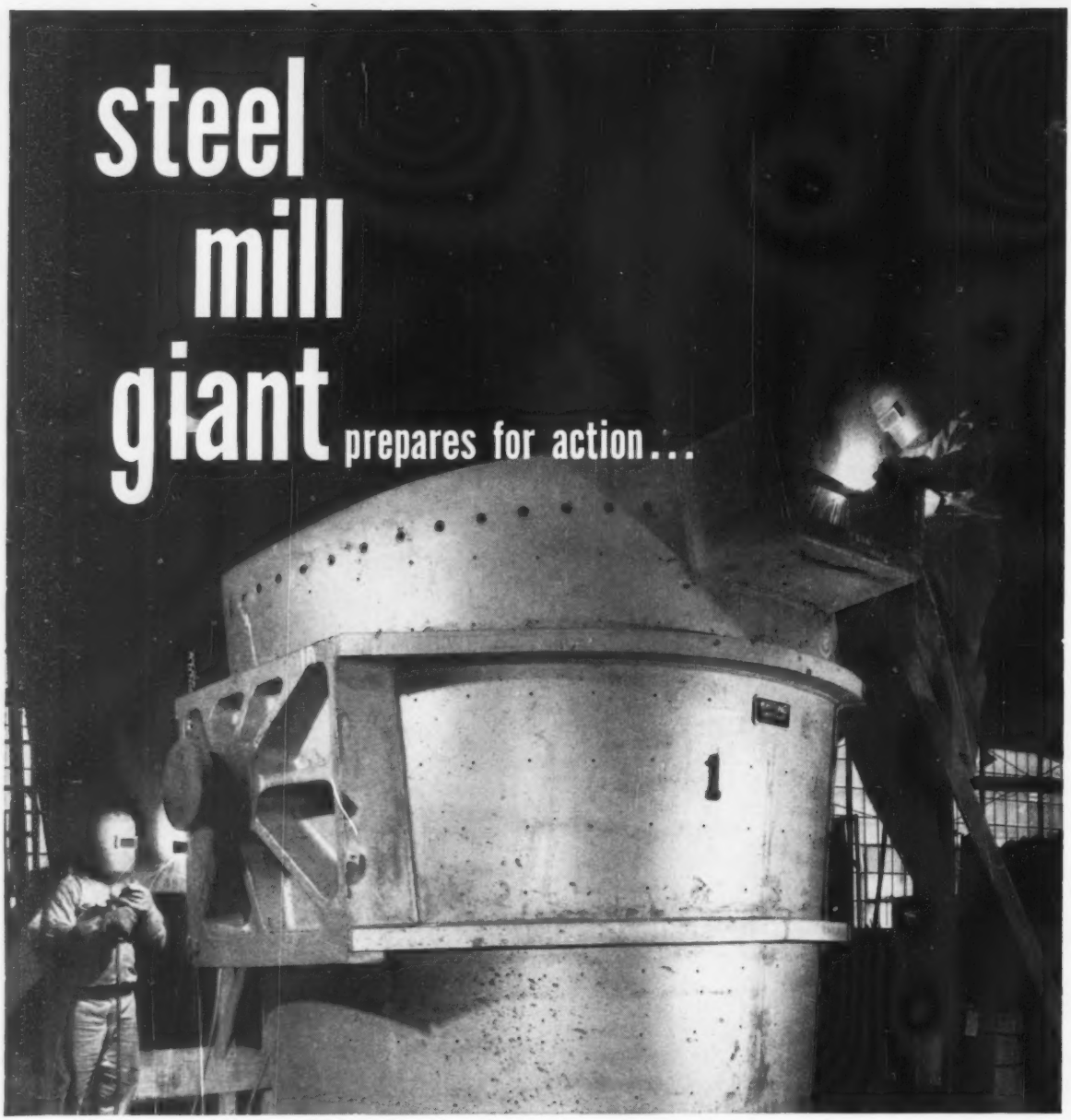

Preparations are nearly complete . . . and soon this giant 60-ton ladle, built to A.I.S.E. specs, will be pouring out profit for another satisfied Whiting customer. Cast steel trunion bases, forged steel trunions, and adjustable swivel-type bottom tapping lever guarantee low maintenance . . . easy control . . . long, rugged service life. When you need ladles—capacities from 100 lbs. to 200 tons—specify Whiting!

FREE CATALOG . . . Describes over 200 ladle types and sizes. Write today!
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What HORACE DREVER has to say about Lindberg heat treating equipment

Mr. Horace Drever, internationally prominent in the industrial heating field, is a Past-President of the Furnace Manufacturers Association and President of Drever Company, furnace manufacturers and commercial heat treaters.

QUOTE from Mr. Drever's unsolicited letter to Lindberg Engineering Company

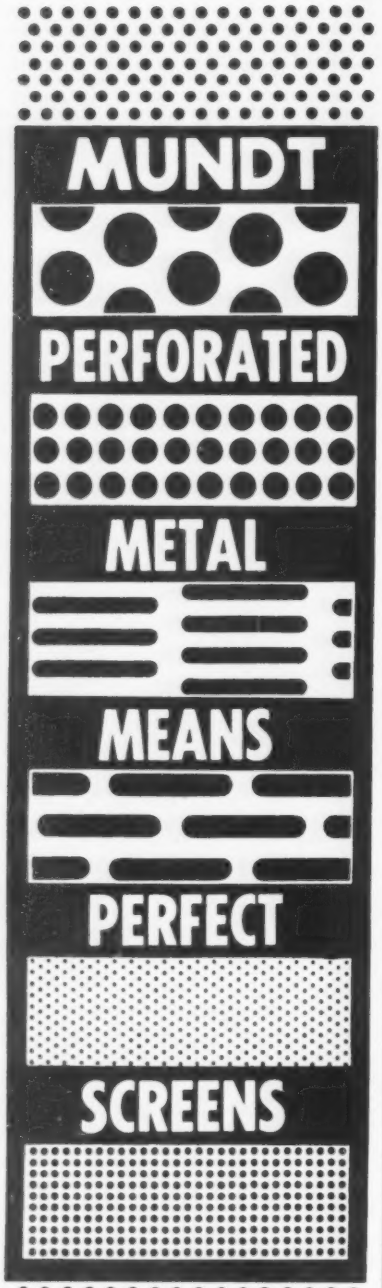
"For the past three and one-half years, we have been operating one of your Type 243618 GVRT Furnaces along with a 500 CFH Lindberg Hyen generator in our commercial heat treating division. We are extremely pleased, not only with the fine quality of work turned out by this equipment but also its relatively trouble-free operation. As evidence of our complete satisfaction we have ordered another Lindberg Furnace of this type."

DREVER COMPANY

Lindberg Furnaces in operation at the Drever Company, Bethayres, Pennsylvania.

We are happy that Mr. Drever, a furnace manufacturer in his own right, originally chose Lindberg equipment for his heat treating plant and that its satisfactory service prompted an additional order. The second Lindberg Furnace is now in production at Drever Company, as the adjacent photo shows. Bless those satisfied customers! If you have a product or process in the metal or ceramic field requiring the application of heat you can depend on Lindberg's engineering and design know-how to provide exactly the right equipment to answer your need. Get in touch with your nearest Lindberg Field Representative (see classified phone book) or write direct to Lindberg Engineering Company, 2441 West Hubbard Street, Chicago 12, Illinois. Los Angeles plant: 11937 South Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg, Ltd., Toronto.

LINDBERG
heat for industry



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New Roebling Wide Width Tempered Spring Steel makes the most of a good thing

. . . (your money, for instance!)

You count your profits in the number of holes in your scrap. And spring steel that doesn't measure up to the most good parts per inch just isn't the right steel for you.

That's why everybody's talking about new Roebling tempered, cold rolled spring steel. Comes in *any* width up to a full handspan wide. 8⅜ inches, that is, by .005 to .062 inches thick. Think how useful that unique extra width can be in getting extra blanks from a length of steel! The thickness is consistent, too.

Now pick a finish – any finish – blued, straw, or bright – plain or ground, Roebling's got it. Buy Roebling Cold Rolled Spring Steel and you get uniform excellence in temper and finish. Delivery? No problem at all. Get full facts and figures by writing Roebling's Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

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planning and doing

the MICE in COUNCIL

One night the mice held a meeting to decide how to end their troubles with the cat. She never failed to take one or two of them every night, and they were desperate. // Many plans were suggested to solve their problem of safety, but all were discarded. At last a smart young mouse spoke up: "Why not put a bell on the cat, so that we can hear her coming?" // Everyone thought that this was a fine idea, and the young mouse was very pleased with himself. Then a shrewd old mouse, who had kept quiet up till then, remarked, "Indeed a good solution, but who will hang the bell around the cat's neck?" // Not a mouse spoke a word. One by one they crept away. The meeting was over.

moral: Not just planning - but doing - brings most profitable rewards.

Planning and doing are very different things. The manufacturer who *plans* to design machines that will accommodate standard stock cylinders has a good idea. The manufacturer who *does* design standard stock cylinders into his machines sees his good idea cut production costs, earn a lower cost per unit . . . and increase profits.

You can earn profitable rewards using Hydro-Line standard stock cylinders. They have all catalog stock dimensions, cost 10% less than custom cylinders, and are delivered quickly. Of course, your order for modified cylinder designs also will receive prompt attention.

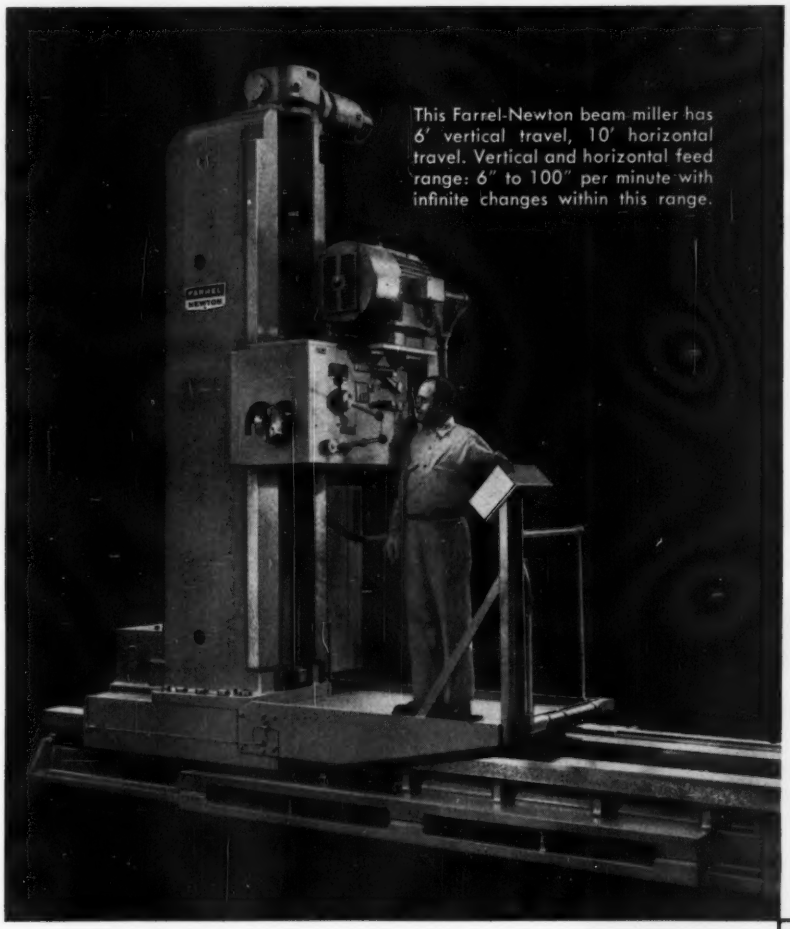
Either way, anticipate your cylinder requirements during the machine-design stage. Look in *Sweet's Product Design File* (Bulletin 8a/Hy) for standard dimensions of stock cylinders and the address of your nearest Hydro-Line representative. Then ask him for the best cylinder for your particular application.

HYDRO-LINE CYLINDERS

5600 PIKE ROAD • ROCKFORD, ILLINOIS manufacturers of: high- and low-pressure hydraulic cylinders • heavy-duty air cylinders • adjustable-stroke cylinders • dispensing cylinders • intensifiers • single-acting cylinders • booster cylinders

Designed primarily for the end milling of structural beams, Farrel-Newton beam millers range in capacities of vertical travel from 4′ to 12′ and horizontal travel

For milling the ends of structural beams... a line of versatile milling machines



This Farrel-Newton beam miller has 6′ vertical travel, 10′ horizontal travel. Vertical and horizontal feed range: 6″ to 100″ per minute with infinite changes within this range.

from 8′ to 60′. Because of the diversity of work size encountered, the machines come furnished with a four-speed head.

They are also equipped with horizontal rack and pinion feed with both ends of the bed finish machined. Result: horizontal feed length can be increased as required in the field by adding bed and rack sections.

Proven through years of field experience, these millers are equipped with electronic feed for trouble-free production under the most punishing conditions. They are not vulnerable to temperature fluctuations nor moisture encountered in open-shop operation.

Consult Consolidated when next you need a beam milling machine.

FARREL-BIRMINGHAM COMPANY, INC.
CONSOLIDATED MACHINE TOOL DIVISION
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CM-56

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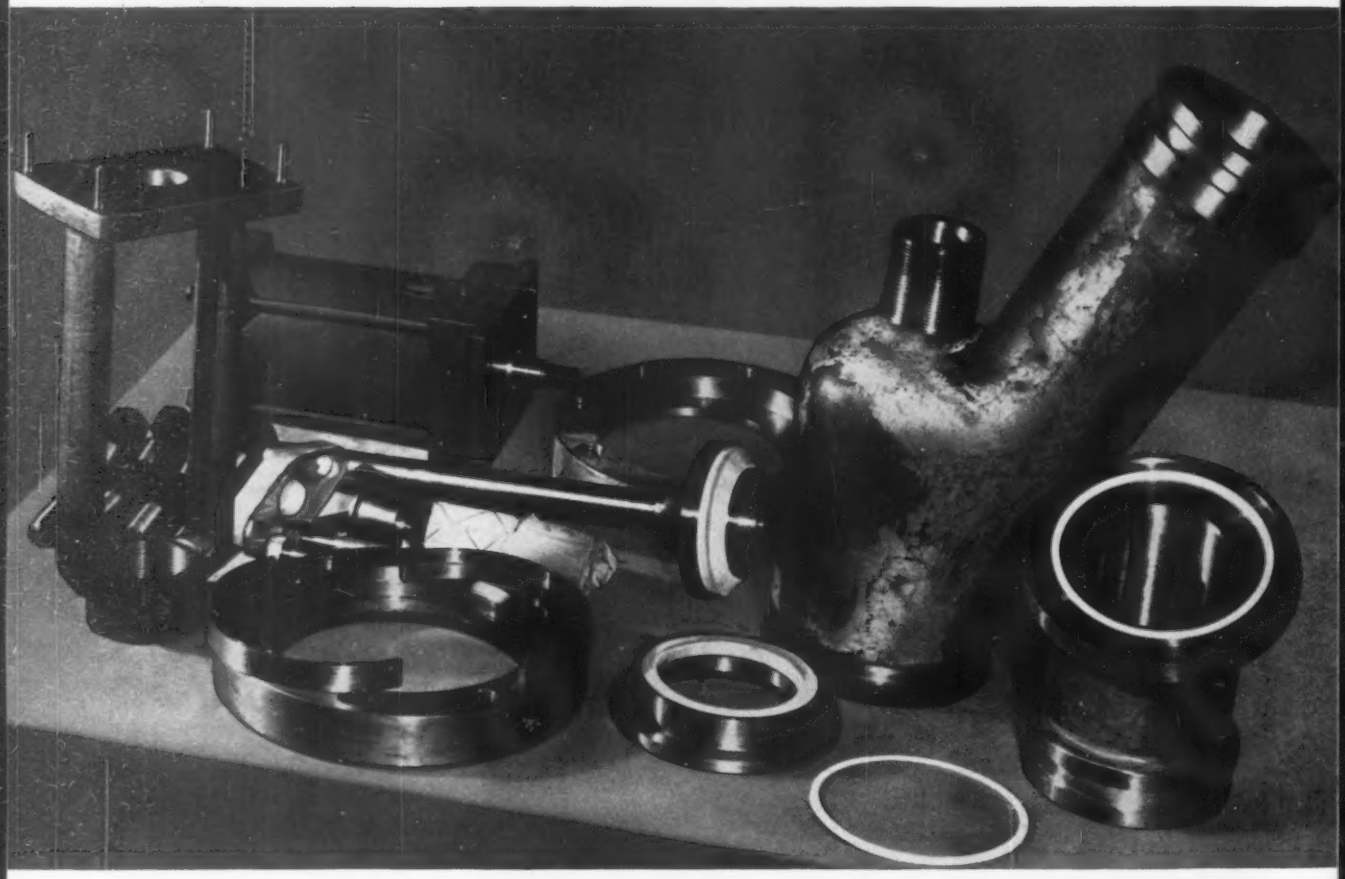
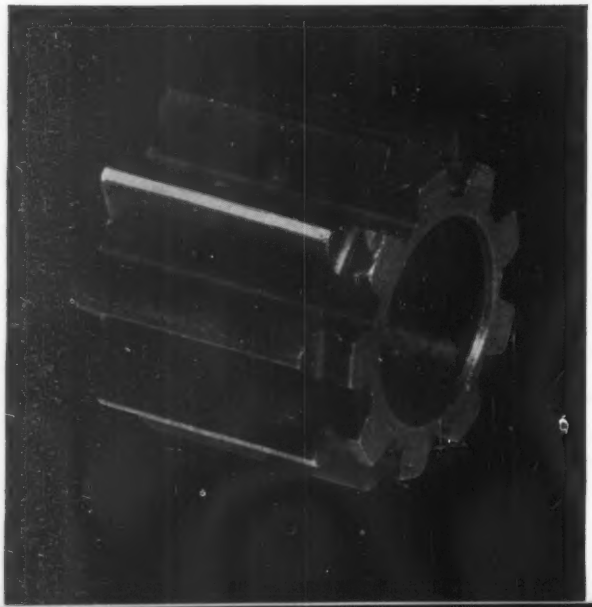
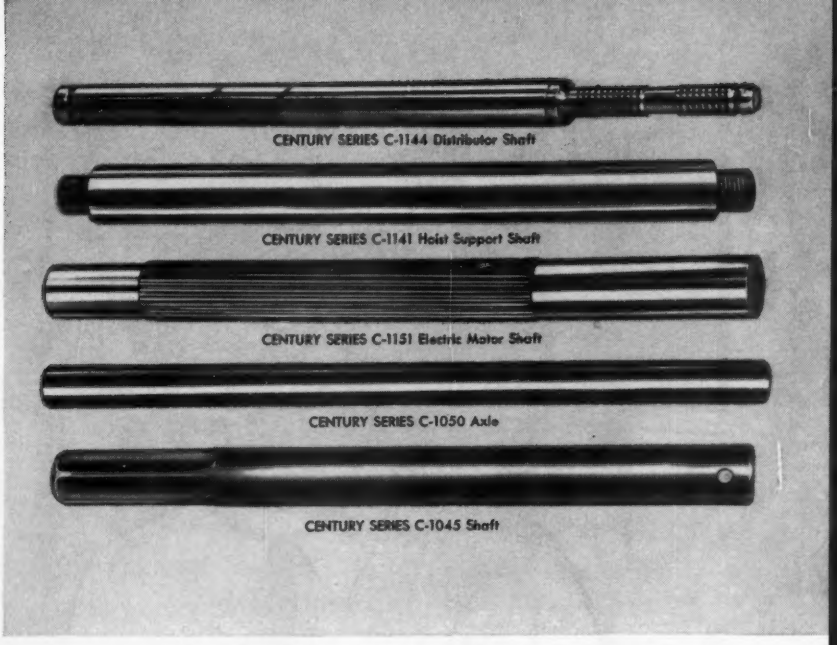




TITANIUM WAS CUT, GROUND, TAPPED, spot welded, heat treated, and hand forged by the Crane Co., Chicago, Illinois. Parts produced were valve components—lower stems, disc stem rings, and disc and stem ring pins—used in Freeport Nickel Company's new $119,000,000 nickel-cobalt processing facilities. Crane reports that Republic Titanium permitted close-tolerance machining with considerably fewer rejects than anticipated.

ALLOY STARTER DRIVE PINIONS ARE MACHINED by Eclipse Machine Division, Bendix Aviation Corporation, Elmira, New York. Subject to extreme torque, impact, and wear, these pinions are produced from Republic Type 8716 Cold Drawn Alloy Steel. Bars are blanked, hobbed, chamfered, and drilled. Teeth are cut on a gear hobber and pointed for easy meshing with the flywheel. Send for details on Republic Cold Drawn Alloy Steel.


CENTURY SERIES C-1144 Distributor Shaft
CENTURY SERIES C-1141 Hoist Support Shaft
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CENTURY SERIES C-1050 Axle
CENTURY SERIES C-1045 Shaft

FIVE DEGREES OF MACHINABILITY are offered by Republic's CENTURY SERIES of cold finished, stress-relieved, carbon steel bars. Of five grades—C-1045, C-1141, C-1144, C-1150, and C-1151—each provides a minimum yield strength of 100,000 psi. Proper selection can result in a more economical combination of strength and machinability. The CENTURY SERIES is characterized by dimensional stability with high physical properties over a range of chemistries. Return coupon for data.

STAINLESS STEEL IS MACHINED into one-piece Hyseal Valve Stems for new American-Standard single-lever mixing faucets by the National Acme Company, Cleveland, Ohio. Completed in a single setup, 10 operations including a multiple end drilling of six holes on a 15° angle are performed on the Republic Type 303 Stainless in 12 seconds. For information on the more than 40 types of stainless steel available from Republic, mail the coupon.

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World's Widest Range of Standard Steels and Steel Products

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Please send more information on:

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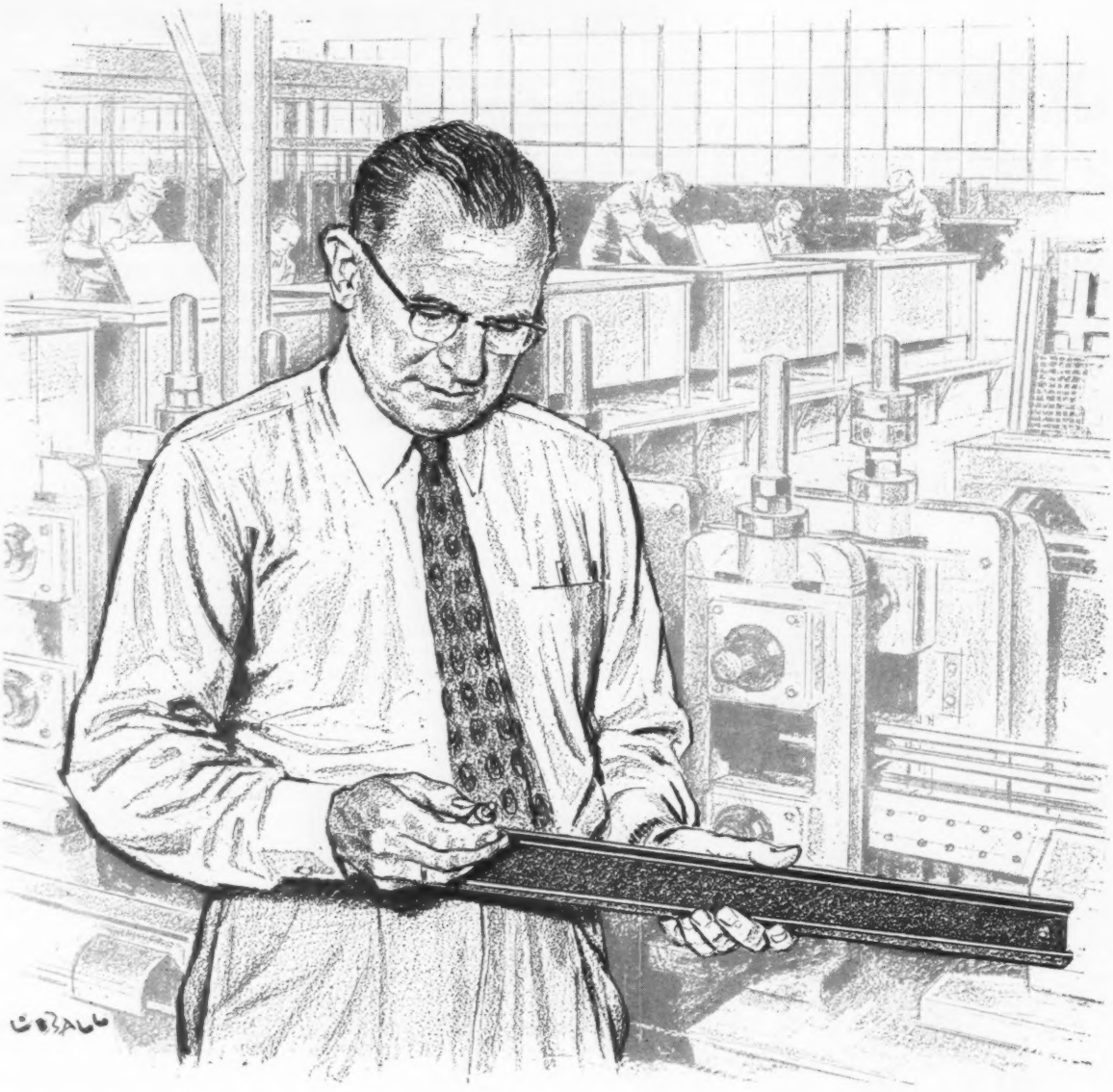

"We know why the word quality is associated with Sharon Steel"

—FRANK CHUFO, Chief Inspector
The General Fireproofing Company

"Over the past quarter-century we have used hundreds of tons of Sharon Steel in vital parts of our office furniture line," states Frank Chufo, chief inspector at General Fireproofing. "We have found Sharon Steel consistently to be to specification with excellent workability, uniformity and tolerance control. I'm convinced it's hard to beat the quality of steel we get from the *Sharon Steel Corporation, Sharon, Pa.*"

SHARONSTEEL **SHARON** *Quality* **STEEL**

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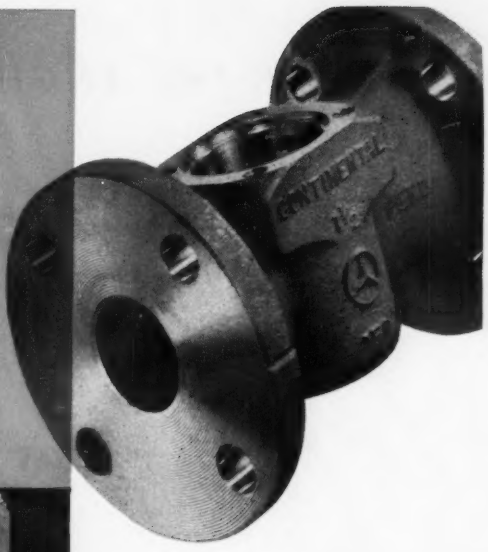
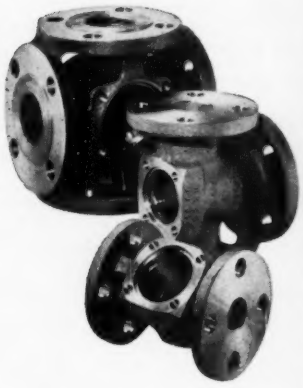
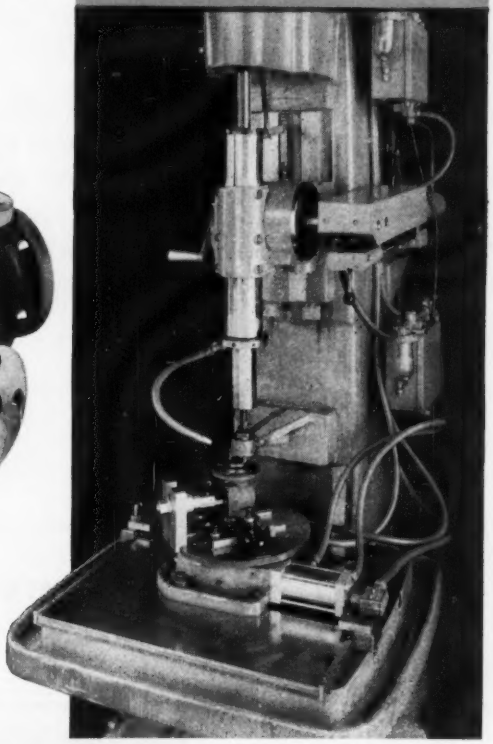
HERE'S DRILLING AUTOMATION ...dirt cheap!

In this case, on valve body flanges*







Problem: "On this Continental Manufacturing job, we have various valve body sizes in tough-machining materials, hole diameters to ¾", and small lot runs up to 25 pieces. To make it a profitable operation, we must have low-cost equipment with fast setups for quick changeovers."

Answer: Standard 21" CINCINNATI, "tailored" with standard air-operated feed and table indexing . . . simple, flexible fixturing for approximately 5 minutes setup time . . . 2½ to 5 minutes cycle time depending on material . . . total equipment cost slightly under $4000!

Let Cincinnati Lathe and Tool service engineers tailor a versatile new CINCINNATI Drilling Machine *to suit your needs exactly!* You get a specialized unit made with the right combination of standard accessories—the most practical approach to LOWEST COST PER DRILLED HOLE!

*The story of another of many shops, large and small, who have brought their drilling problems to our service engineers for help. Ask your Cincinnati Lathe and Tool Dealer for service engineering on your drilling problem. If you can't reach him immediately, wire us—collect!

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HYDRASHIFT Lathes • CINCINNATI Drilling Machines
SPIROPOINT Drill Sharpeners

HOW THE ENGINEERING SERVICES OF

Central Foundry

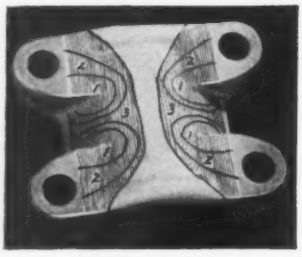
help you design better castings at lower cost

Many new developments here at Central Foundry have broadened the field of application for castings and have given design engineers greater latitude. To assist you in exploiting these new methods and materials to fullest advantage, each of our engineering departments—design, experimental, process and metallurgy—is at your disposal. Central Foundry is also using a number of testing techniques such as stress analysis, cobalt radiography and sonic testing, that have proven invaluable in lowering the cost and improving the quality of castings. These procedures help us to determine the best design and method of producing a casting, either by the green sand method or the shell mold process, and the best material for the casting, either grey iron, malleable iron or ArmaSteel.

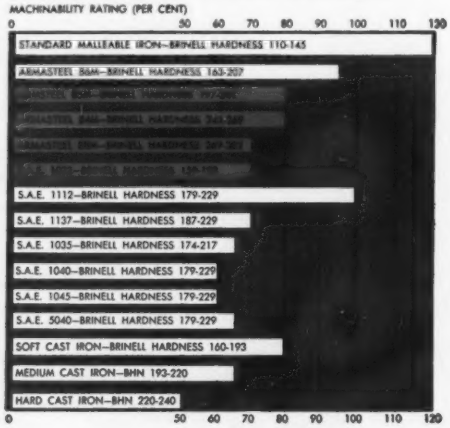
Central Foundry has the capacity to deliver, on schedule, quality castings in production quantities.

STRESS ANALYSIS FOR IMPROVED DESIGN

An important part of our engineering services is the stress analysis laboratory. Stress analysis discovers the amount of stress on a part due to its service function and is an important aid in determining and improving the strength of a part. Improved casting design can be accomplished through the use of stress-analysis by more effectively distributing the metal in the part. The U-bolt anchor plate shown here is a case in point. Our customer was experiencing failures in this part and asked us to see what we could do to solve the problem. Using stress analysis the part was completely redesigned for maximum efficiency. The redesigned part is 35% stronger, 42% lighter and less costly.



EXCELLENT MACHINABILITY FOR INCREASED PRODUCTION



CENTRAL FOUNDRY DIVISION

REDESIGN FOR STRENGTH

This is a rear spring clip pad that was converted to a casting with the help of stress analysis. The clip pad supports the shock absorber arm and clamps the spring to the rear axle of an automobile. When produced as a stamping, this part weighed 4-1/4 pounds. However, when designed as an ArmaSteel casting, weight was reduced to 2-9/10 pounds. Most important, based on comparative stress analysis tests, the casting is *30% stronger* than the stamping. (In addition, the holes are produced by the foundry, making it unnecessary for the customer to punch them.) This conversion from a stamping to a casting resulted not only in increased strength, but in substantial cost savings, as well.

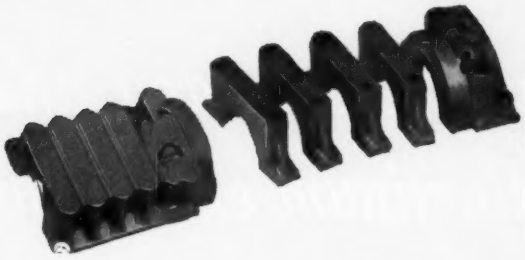
REDESIGN FOR IMPROVED PRODUCT AND ECONOMY

Many of our customers have found that redesigning a product to be made as an ArmaSteel casting rather than as a fabrication, forging or stamping, has resulted in a better part at less cost. The fabricated design of a rear wheel truck hub at the left consists of a forged base with a steel plate welded in place to form the smaller flange. The casting on the right, designed jointly by the customer and our engineers, is of single piece construction, is lighter, stronger and less costly than the fabricated design and eliminates the fitting and welding of the small flange.

FABRICATED DESIGN ARMASTEEL CASTING

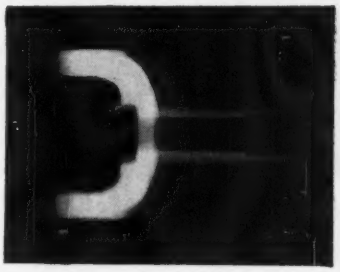
PROCESS ENGINEERING FOR LOWER COST

Our process engineers are continually looking for ways to more economically produce castings, thus lowering the finished-product cost. Shown here is a single casting that combines 5 bearing caps used on a V-8 engine. The casting is almost completely machined as a single piece, and the parts are then separated in a final operation. Substantial savings are realized in both casting and machining costs.



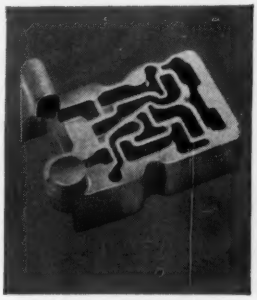
COBALT RADIOGRAPHY FOR ASSURED QUALITY

Radiography, by means of Cobalt 60, has drastically reduced the time required to check castings and is an important aid in obtaining the best possible casting quality. In an effort to eliminate a machining operation on the universal joint yoke shown here, a design change was made in the tube section of the part. When sample castings of the new design were checked radiographically it was immediately apparent that the design was unsatisfactory since it caused acute metal feeding problems. By redesigning and further checking by radiography, Central Foundry was able to produce, in the shortest possible time, a lighter casting which required less machining in our customer's plant.



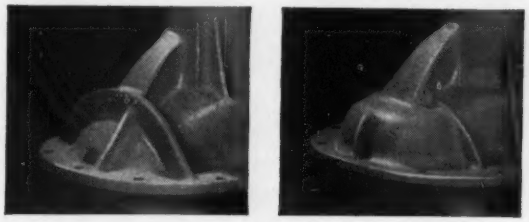
SHELL MOLDING FOR GREATER ACCURACY

Shell molding, a relatively new process of making castings, is now being employed extensively for fast, simple production of complicated castings, such as those requiring narrow, accurate passages and cross sections. It is practically impossible to produce certain parts in any other way without prohibitive costs; this is especially true of ferrous metals. Complicated parts like the manual control valve body shown here, a part of the automatic transmission of a military vehicle, are readily cast in grey iron when the shell process is utilized. The part had been considered as an aluminum die casting, but was thought unsatisfactory because of adverse expansion and wear characteristics. In this case, meeting the requirements for very close tolerances on the thickness and location of ports was made possible by the shell molding process.



REDESIGN FOR WEIGHT REDUCTION

Vehicle weight reduction is a matter of increasing importance to design engineers . . . and more and more existing parts are being converted from a low or medium to a high strength ferrous material such as ArmaSteel. On the left is a grey iron differential carrier currently used in an automobile. By taking advantage of the superior physical properties of ArmaSteel, it was possible to design the part on the right which is *five pounds lighter*. The modulus of elasticity of ArmaSteel is approximately 60% greater (the tensile strength about twice as great) than the grey iron material.



MEMBER MALLEABLE CASTINGS COUNCIL

90

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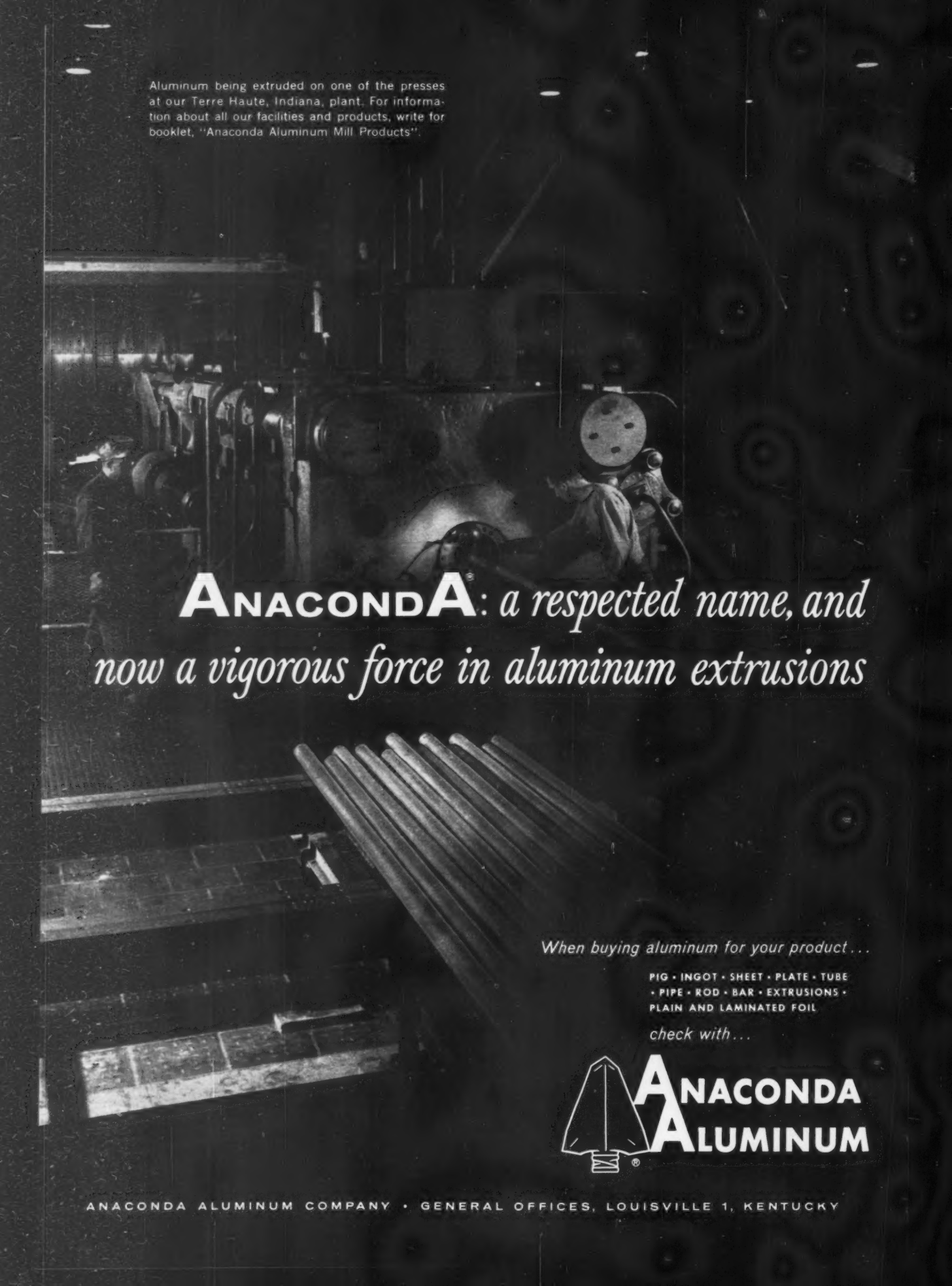

Aluminum being extruded on one of the presses at our Terre Haute, Indiana, plant. For information about all our facilities and products, write for booklet, "Anaconda Aluminum Mill Products".

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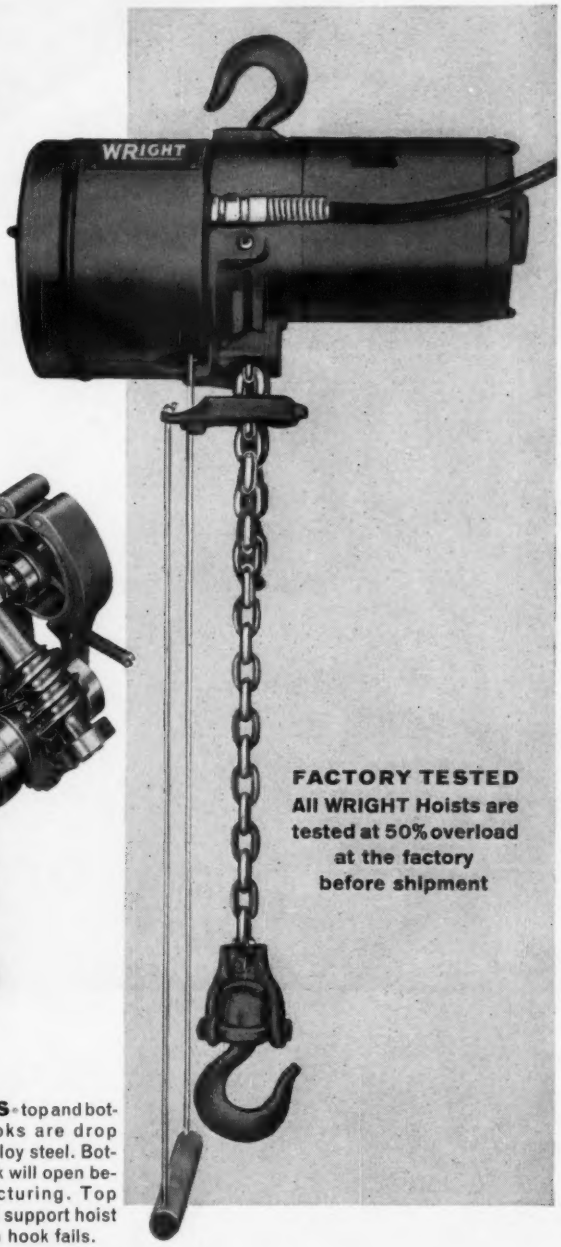
Light, Rugged Wright Electric Chain Hoist with Extra Features at No Extra Cost!

• Here's an inside picture of the many extra features you get at no extra cost with the WRIGHT Electric Chain Hoist. Shown is the simply-designed yet ruggedly-constructed "heart" of the famous WRIGHT Electric Chain Hoist. The use of a double worm and gear reduction increases the efficiency of this compact unit, and reduces the weight at the same time. The result is a trouble-free hoist that is light enough to move from job to job and small enough for locations where overhead space is limited.

• Double braking for double safety is another extra feature of the WRIGHT Electric Chain Hoist. Spring-operated motor brake locks instantly when control cord is released. In addition, self-locking worm gear drive also provides positive load braking action. Both brakes work together automatically.

• The WRIGHT Electric Chain Hoist is available with two types of reeving — Single Chain (300 to 2000 lbs.), Double Chain (3000 to 4000 lbs.)



HOIST MOTOR • specially wound to give extra torque for intermittent hoist duty. 15 feet of three wire rubber covered conductor cable with strain reliever attachment.

CONTROLLER • manually operated heavy duty drum type with large contact points and full-arc shields. Fast response enables spotting a load within fractional inch limitations.

HOISTING GEARS • made of high grade phosphor bronze, worms of heat treated steel. Gears are fully enclosed in a continual oil bath.

CHAIN • heat treated alloy steel with zinc coating. Accurately blocked to fit load sheave. Ductile, yet hard enough to resist wear and abrasion.

LOAD WHEEL • drop forged, heat treated alloy steel. Forged integral with load shaft to eliminate the need for connection keys or spline. Chain pockets are precision machined to fit links. Wearing surfaces are hardened, bearing surfaces are ground.

CONNECTOR • drop forged, heat treated alloy steel couplings (connecting the chain and hook) permit hooks to swivel and rock.

HOOKS • top and bottom hooks are drop forged alloy steel. Bottom hook will open before fracturing. Top hook will support hoist if bottom hook fails.

FACTORY TESTED
All WRIGHT Hoists are tested at 50% overload at the factory before shipment

WRITE FOR FULL INFORMATION

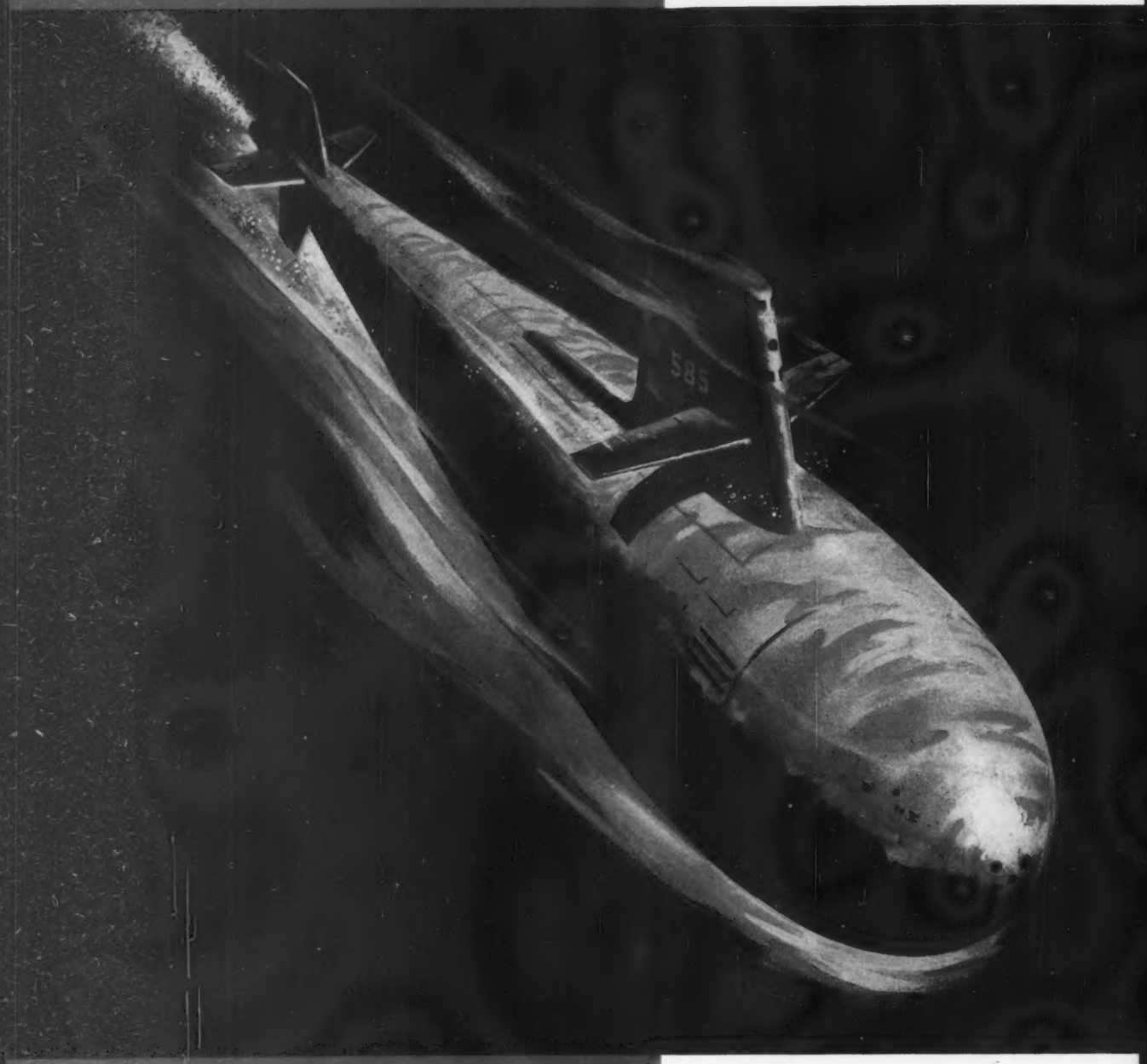
Detailed information about the five WRIGHT products shown is available by writing our York, Pa., office. Please specify literature by number

Electric Chain Hoist DH-73
Type "C" Pull-A-Ways DH-56
Safeway Hand Hoists DH-164
Roller-Bearing Trolley DH-242
Jib Cranes • DH-300

WRIGHT HOISTS

ACCO

Wright Hoist Division • American Chain & Cable Company, Inc.
York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.



NEW LOOK IN NUCLEAR SUBS . . . The Navy's new submarine Skipjack, built by General Dynamics Corporation's Electric Boat Division in Groton, Connecticut, features a revolutionary blimp-shaped hull and diving planes on the sail (formerly known as the conning tower). Although her speed is classified, Skipjack is the fastest of the A-Subs.

UNITED STATES PIPE & FOUNDRY CO.

Steel and Tubes Division

STEEL & TUBES U.S. PIPE DIVISION

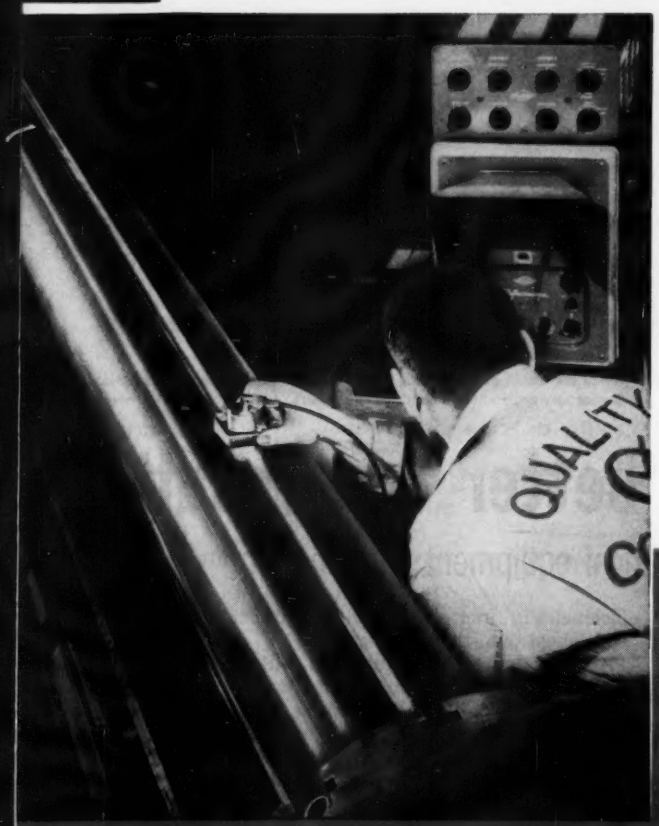
BURLINGTON, NEW JERSEY

SALES OFFICES: BURLINGTON, BOSTON, BIRMINGHAM, CHICAGO, CLEVELAND, DALLAS, LOS ANGELES, NEW YORK, PITTSBURGH, SAN FRANCISCO

"HYDROFORGED" FINE-GRAIN STAINLESS PIPE FOR THE NUCLEAR NAVY*

THE PROCESS: The starting point is a high quality machined hollow billet made centrifugally which is cold expanded by hydrostatic pressures up to 50,000 PSI in specially designed massive metal dies. After "hydroforging", the pipe is given a recrystallizing anneal which results in the grain refinement characteristic of wrought stainless steel.

THE PRODUCT: After final machining of the O. D. and I. D. surfaces to 125 micro inch finish, the pipe is subjected to all the testing requirements of Military Specification MIL-T-18063A (Ships) which covers seamless austenitic steel tubes and pipe intended for radioactive system service. This specification includes: chemical analysis, tensile properties (for Type 304 stainless steel—75,000 PSI minimum tensile strength, 30,000 PSI minimum yield strength, 35% minimum elongation), expanding and flattening tests, hydrostatic pressure test, intergranular corrosion test, macro-etch, ultrasonic and liquid penetrant examination.



PIPE BEING ULTRASONICALLY TESTED IN ACCORDANCE WITH MILITARY SPECIFICATION MIL-T-18063A (Ships)

SIZE RANGE
DIAMETER—8" through 28" O.D.
WALL—½" to 4"
LENGTH—Up to 22 feet

TYPES OF STAINLESS
Austenitic grades, including E.L.C.

*** U. S. NAVY SERVICE APPLICATIONS FOR HYDROFORGED STAINLESS INCLUDE:**

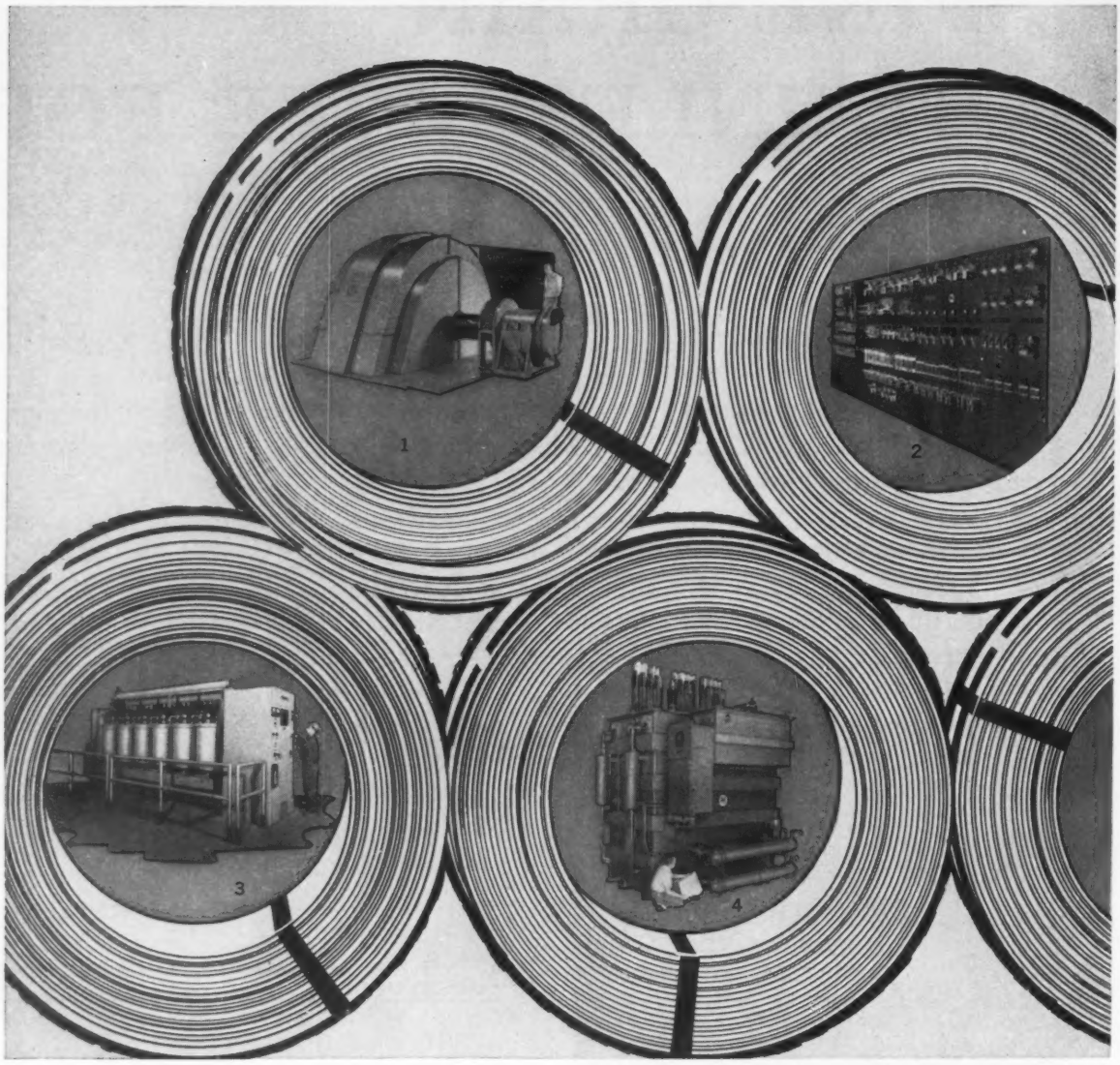
Pipe for valve operating system reservoirs and primary water preheaters

Primary coolant piping for nuclear submarines and surface ships

Seamless welding fitting stock for large diameter reactor piping systems for submarines and surface ships

Demineralizer shells

ALLIS-CHALMERS



Allis-Chalmers equipment for progressive mills: **1.** motor, **2.** control, **3.** mercury-arc and semi-conductor rectifiers, **4.** furnace transformers

The right start for better end results

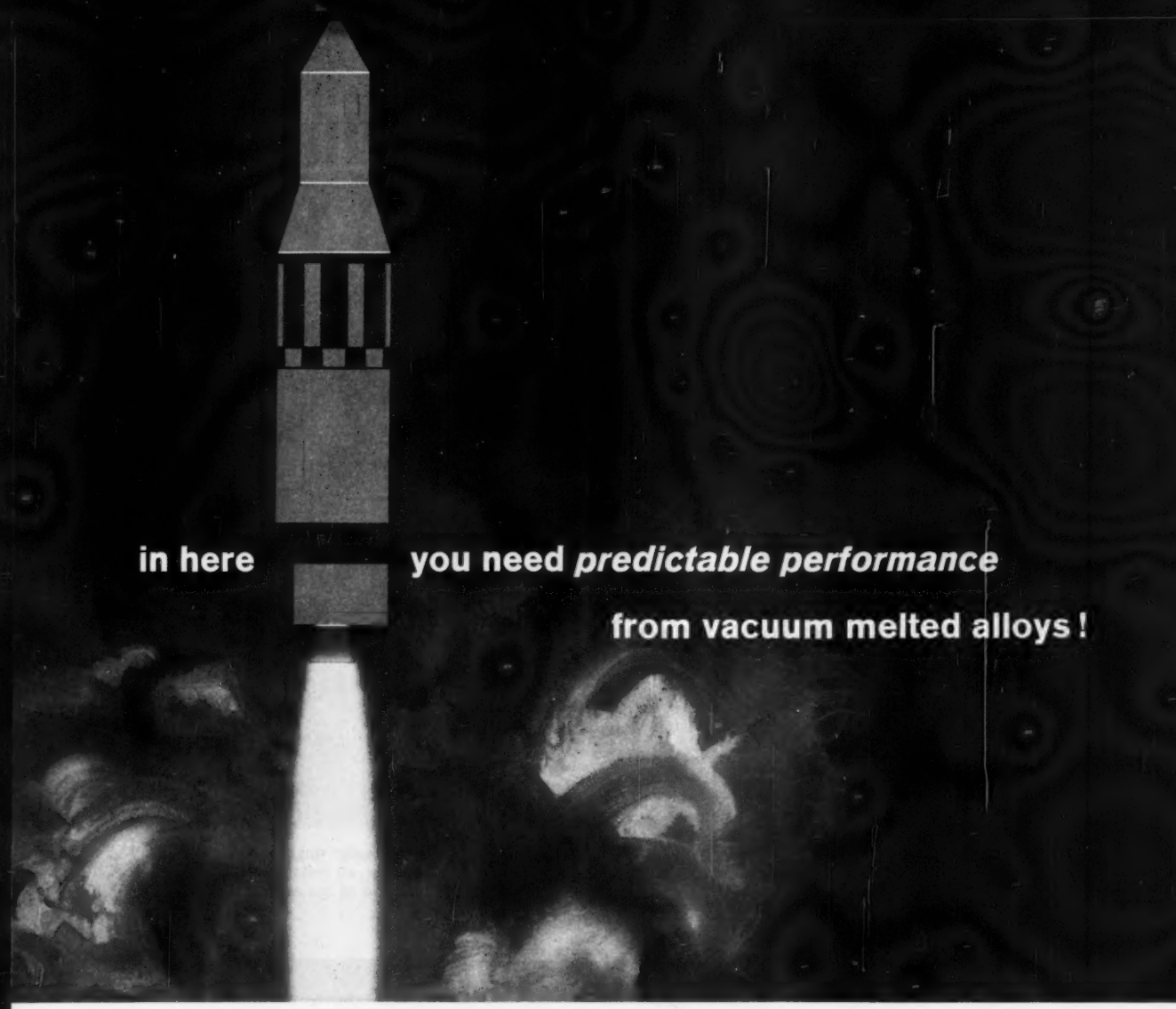
begins with Allis-Chalmers electrical equipment coordination

Proper application . . . efficient use of electric power — these are essential ingredients to peak mill output. No single piece of equipment in a process line can guarantee this result, for its performance depends on the accurate function of other devices.

Allis-Chalmers equipment is matched to mill standards for maximum performance. Blooming mills, hot-strip mills — wherever electric power is used, Allis-Chalmers coordinated engineering is the key to higher efficiencies . . . increased yield . . . a finished product of the highest quality.

Allis-Chalmers is helping steel mills with their new plant and modernization programs. Many have improved output and product quality without the cost of major plant alterations.

There's an Allis-Chalmers steel mill specialist near you. *Call him direct, or write* **Allis-Chalmers,** *Industrial Equipment Division, Milwaukee 1, Wis.* A-1272



Guesswork has no place here. High temperature alloys that make up this missile's critical components must be right every time . . . with predictable performance built into each forging, fastener, and other component parts.

Vacuum melted alloys—new, predictable performing alloys made by Carpenter's exclusive VACUMELTROL and CONSUMET* processes—provide this dependability. And with it, component manufacturers report improved forgeability, better finishes, fewer rejections, faster production.*

Carpenter's many years' experience in producing these cleaner, more uniform and dependable vacuum melted alloys is your assurance of the best predictable performance at elevated temperatures . . . or at any temperature.

A call to your Carpenter representative will put this experience to work for you today. The Carpenter Steel Company, Reading, Pa.

**Carpenter trademarks for alloys melted in vacuum induction and consumable electrode furnaces, respectively.*

a new company 70 years old

Carpenter steel

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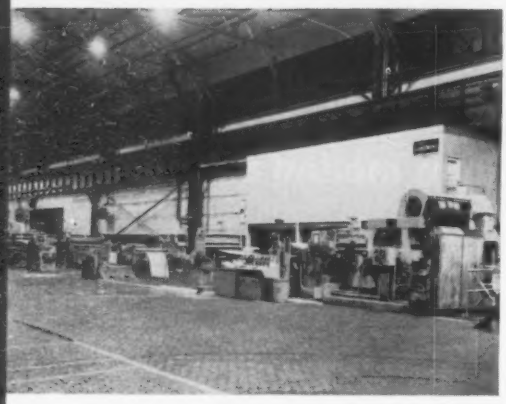
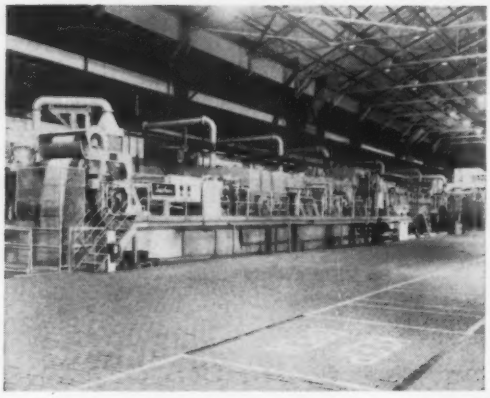
complete normalizing line:

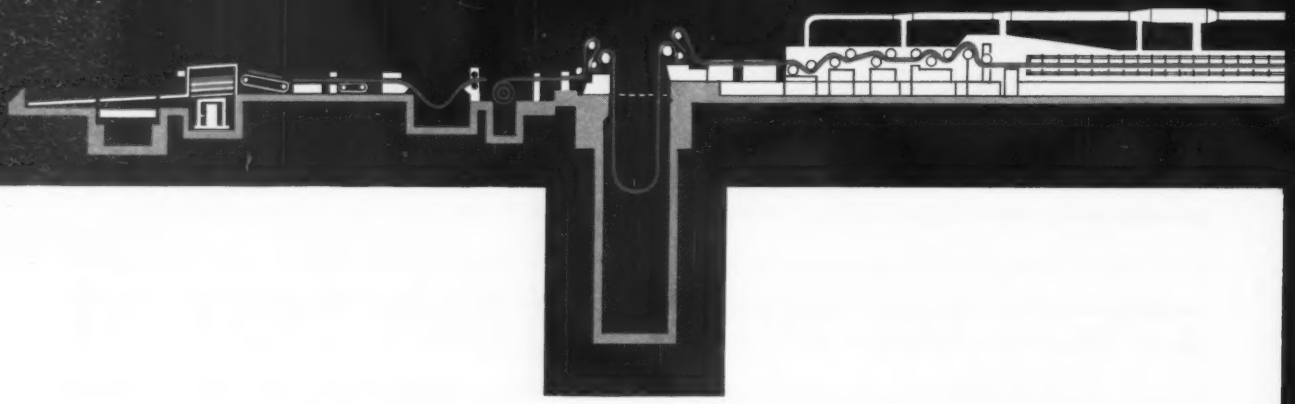
ALL SURFACE!



Exit end of the line, showing looping pit, "re-coiler," automatic shear and sheared sheet piler.

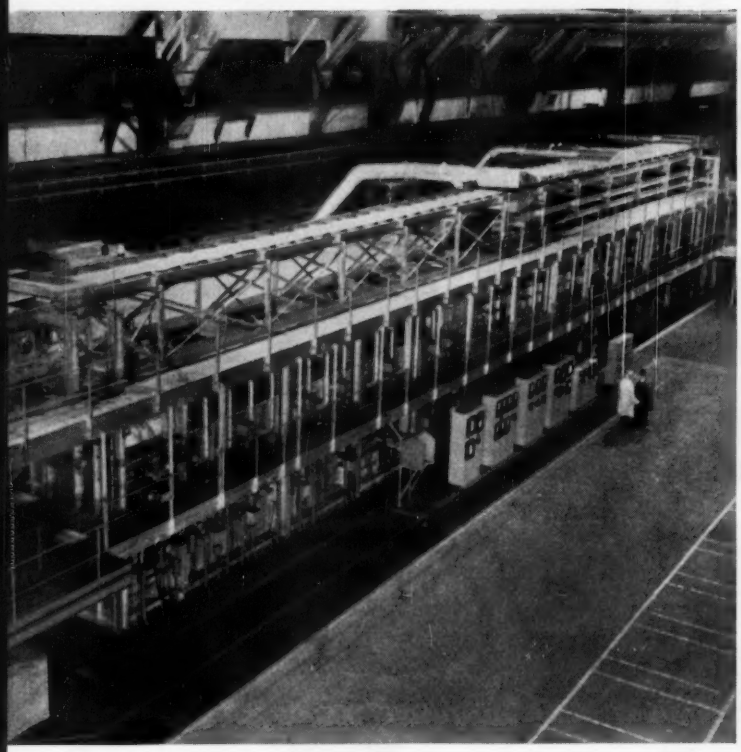


Pickling section includes acid bath, water rinse tank, brush scrubbers, alkali tank and dryer, all installed by Surface. This view shows the exit end of the section.

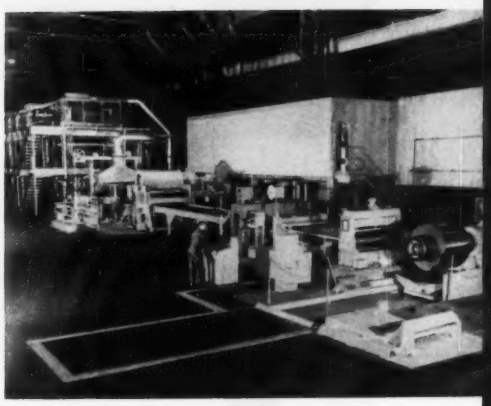


from payoff...to payoff

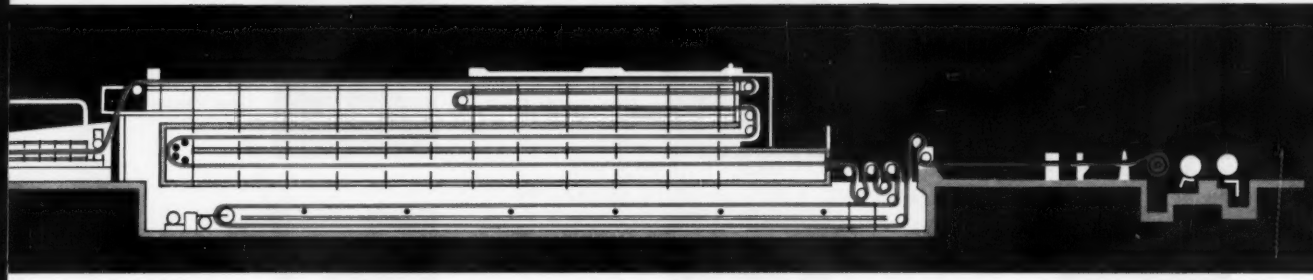
Worldwide engineering and manufacturing facilities through associates in Australia • Belgium • France • Germany • Great Britain • Italy • Japan



Rockwells in the low 40's are achieved consistently in this three-level normalizing furnace. Heating zone is on the lower furnace level; convection cooling in the middle; air blast cooling at the top. A horizontal "looper" is located underneath the furnace.



Payoff reel marks the entry of low carbon stock after cold rolling. Speeds of 150 fpm on 60" wide strip are attained.



This complete new Surface normalizing line for vitreous enamel stock started paying off on its first day of operation. For example, its capacity of 30,000 lbs. an hour puts this mill forcefully into the market for deep draw quality strip. More than adding new selling power, this big line increased productivity per operator by an almost unbelievable amount.

From payoff reel to real payoff, the entire installation is a graphic demonstration of Surface's qualifications as prime contractor. Applying its global experience in metallurgy, combustion, chemistry, and mechanization, Surface engineered and installed the complete line.

Take the opportunity now to evaluate the prime contracting skills available at Surface, and mobilize them for your profit, ***wherever heat is used in industry.***

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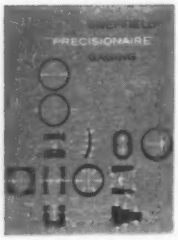

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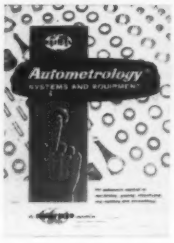

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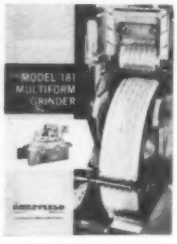

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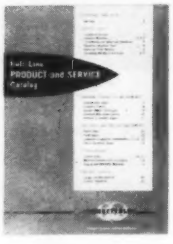

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SHEFFIELD
Corporation *Dayton 1, Ohio*

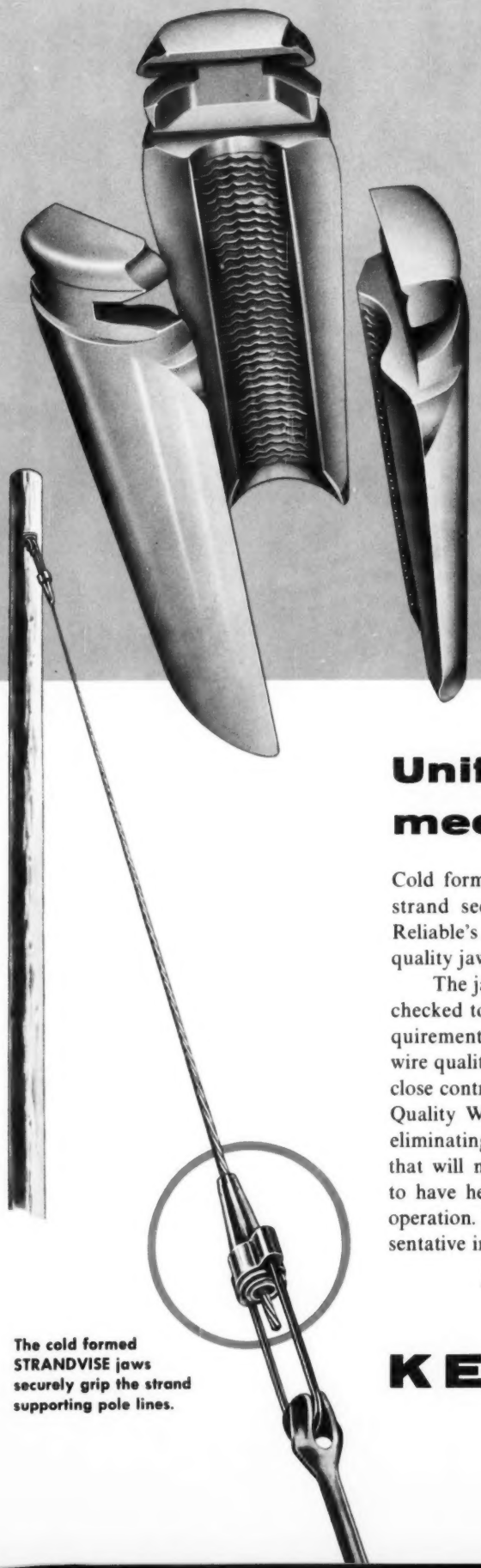
A subsidiary of the Bendix Corporation

Gages, Measuring Instruments, Automatic Gaging & Assembly Systems • Machine Tools • Contract Mfg.

10 STAGE COLD FORGING

KEYSTONE FORGING WIRE WIRE STUDY

Reliable ELECTRIC COMPANY
Franklin Park, Illinois



The cold formed STRANDVISE jaws securely grip the strand supporting pole lines.

Uniform KEYSTONE WIRE meets the demand . . .

Cold formed jaws that clamp together in a "death grip" hold the strand securely when tension is applied — this is the secret of Reliable's remarkable STRANDVISE®. And the secret of producing quality jaws successfully is Keystone Wire!

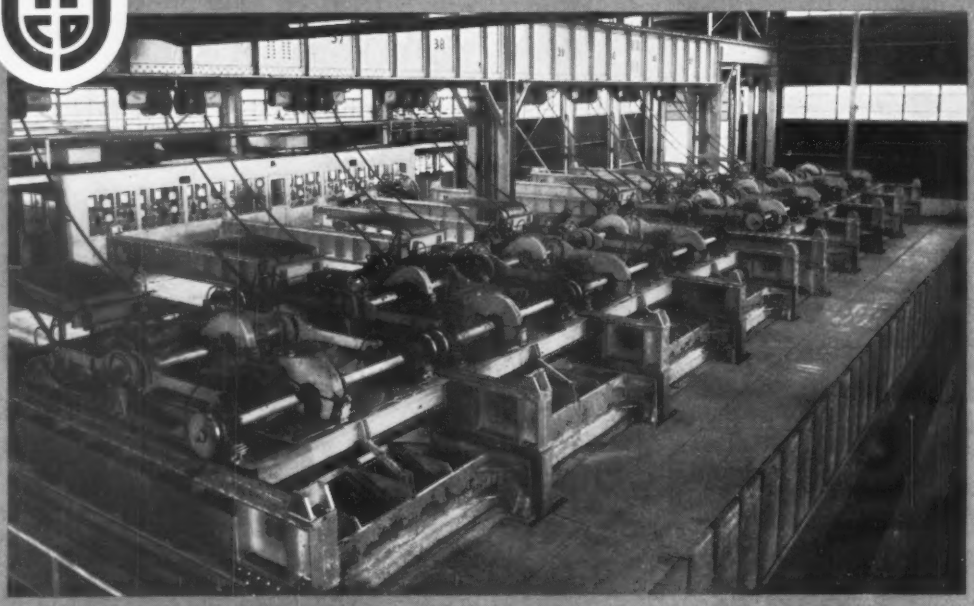
The jaws are formed in ten cold forging steps — finish is micro-checked to a tolerance of ±.0015 on smallest chucks. Such rigid requirements challenged Keystone metallurgists to combine the right wire qualities — flowability for extreme forming, uniform temper and close control of diameter on a wide range of sizes. Keystone Forging Quality Wire continuously performs this intricate die forming job, eliminating rejects and waste previously experienced . . . making jaws that will not fail — sharp teeth that bite in and hold. We're proud to have helped Reliable find the solution to a complicated forging operation. We'll be glad to help you, too! Invite your Keystone representative in today for a discussion of your wire problems.

Keystone Steel & Wire Company, Peoria 7, Illinois

KEYSTONE

WIRE FOR INDUSTRY

AMCO SOAKING PITS



Special design cuts costs on every ton of steel heated

Partial list of installations

Jones & Laughlin Steel Corp., Cleveland Works
Republic Steel Corp., Buffalo Works
National Tube Division, National Works, Lorain Works
Tennessee Coal & Iron Division, Fairfield Works
Timken Roller Bearing Co., Canton, Ohio
Steel Company of Canada, Ltd., Hamilton, Ontario
Dominion Steel and Coal Corp.,* Sydney, Nova Scotia
U.S. Steel Corp., Edgar Thomson Works, Duquesne Works
Alan Wood Steel Company, Conshohocken, Pa.
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ARMCO Steel Corporation, Butler, Pa.
U.S. Steel Corp., Gary Steel Works
Colorado Fuel & Iron Corp., Claymont, Delaware
Lukens Steel Company, Coatesville, Pa.
International Harvester Co., Wisconsin Steel Division
Dominion Foundries & Steel, Ltd.,* Hamilton, Ontario
Columbia Geneva Steel Division, Geneva, Utah
U.S. Steel Corp., Homestead District Works
Kaiser Steel Corp., Fontana, Calif.
Rotary Electric Steel Co., Detroit, Mich.
Laclede Steel Company, Alton, Illinois
South African Iron & Steel Indus., South Africa
Phoenix Iron & Steel Co., Phoenixville, Pa.
Youngstown Sheet & Tube Co., Campbell Works
Youngstown Sheet & Tube Co., Indiana Harbor Works
Tata Iron & Steel Co., Ltd., India
Inland Steel Co., Indiana Harbor Works
Pittsburgh Steel Co., Monessen, Pa.
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Canadian installations designed and erected by AMCO Furnace Contractors Ltd., Rexdale, Toronto, Ont.

Engineering consultation in your plant on request

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ENGINEERS AND CONTRACTORS

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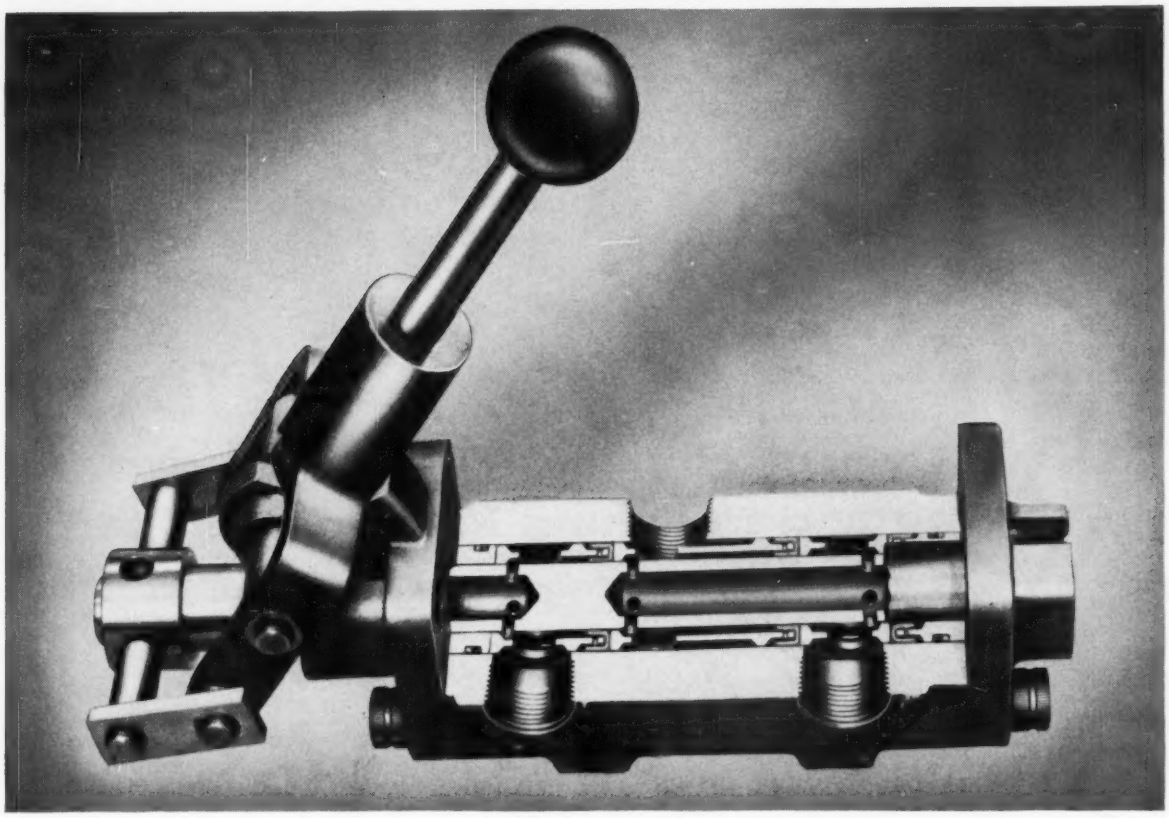
MANOR BUILDING PITTSBURGH 19, PA.

DOWN WITH DOWN-TIME! Homestead® Durable-Seal Operating Valves *up* your plant efficiency with long valve life and maintenance-free operation, where water, oil, or soluble oil is the operating medium. Here's why: Homestead's simple design does the trick. One piston instead of two



means fewer moving parts, less wear. Easy operation, positive seal, and longer life are built in, because sealing lips of leather "U" packings are hydrostatically balanced by the *same* pressure on both sides of the lip. No shear, no distortion, no undue wear, as ports pass over leathers. And, what little maintenance may be necessary can be done in the line—saving time and temper. For details on Homestead Hydraulic Operating Valves, mail coupon.

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"Serving since 1892"
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Please send Reference Book 39-6 and prices on all types of Homestead Operating Valves. 98

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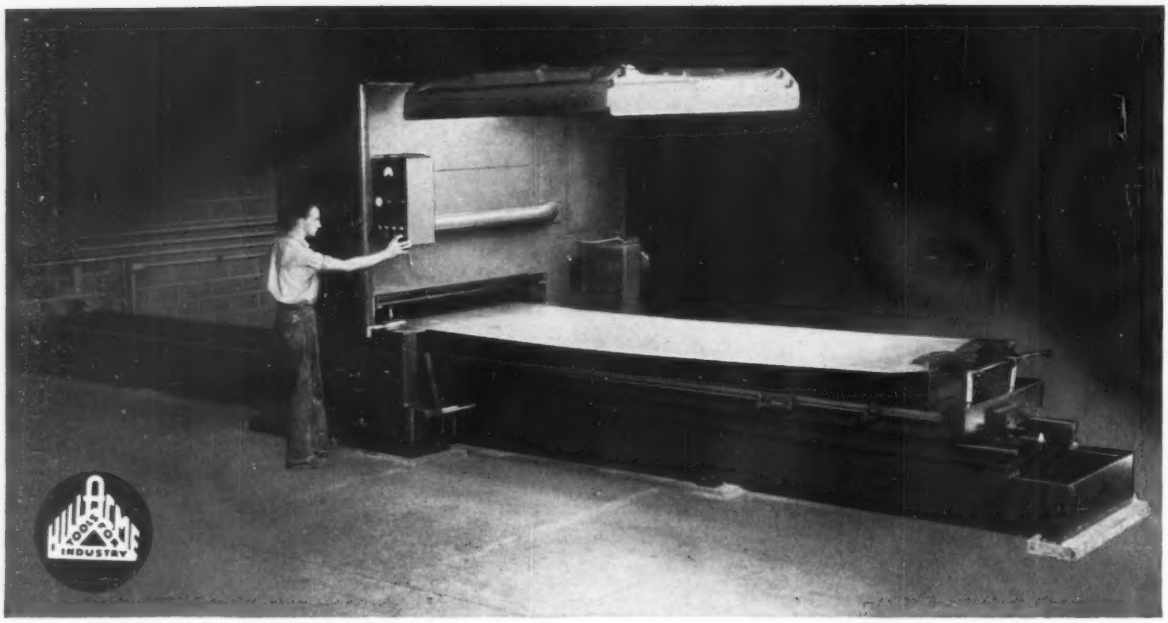
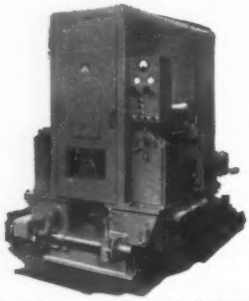
City..... Zone.... State.....



HILL Sheet and Plate polishing machine with reciprocating table and vertical 2-ROLL head.

With YOUR OWN HILL Abrasive Belt Grinding and Polishing Machine you can:

Vertical 2-ROLL HEAD. Two rolls, accurately controlled for speeds and pressures with easy adjustment for proper tension of the endless abrasive belt. A variety of grits are available.



HILL Pinch Roll type with vertical 2-ROLL head for polishing strip or single pieces. Can be used singly or in multiple units for line production.

1. Prepare the precise finish best suited to your needs.

2. Insure close inventory control of finished material.

3. Save up to half the cost of buying prepolished sheet and plate.

Increasing volume production points up the advantages of a HILL Grinding & Polishing machine in your own plant. No delay in deliveries – No premiums paid to outside sources for material that ALMOST meets requirements.

HILL 2-ROLL Vertical Abrasive Belt Grinding and Polishing machines are made in two general types for producing superior finishes on flat surfaces as required by manufacturers of decorative plastics, auto bumpers, engravers plates, home appliances, etc. Both types are built in polishing widths up to 60". Larger sizes can be furnished.

THE HILL ACME COMPANY

1209 WEST 65th STREET • • • CLEVELAND 2, OHIO

"HILL" GRINDING & POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • "ACME" FORGING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • ROTARY SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES • MATERIAL HANDLING EQUIPMENT

and they run
and they run
and they run

1903—
Indianapolis.
a trolley car.
a rolling adventure surrounded by noise.
pennies, nickels, children . . .

and inside—
a Fairbanks Morse electric motor.
it drove the trolley over thousands of miles
and rode with it
into glorious retirement.

pick a year—
from the turn of the century until now.
pick a month,
pick a day,
pick a city,
pick a town—
our motors are in its history . . .
pulsing, driving, working.
powering the things we need
and the things we want.
pushing our daily advances.
pulling us into the future.

today our electric motors
are bigger and better.
they're also smaller and stronger,
surer and more powerful.

they operate in air and underground,
in freezing temperatures and underwater,
in gas-filled areas
and radiation atmosphere.

they power oil burners and compressors,
elevators and fans,
pumps, conveyors and saws.

they are adaptable
to every phase of every industry
for many reasons and more purposes.
they keep us growing
and they keep us improving.
they keep us ahead of the day before
and on the heels of the day ahead.

they are our heartbeats
and they run and they run and they run.

Fairbanks, Morse

A MAJOR INDUSTRIAL COMPONENT OF **FAIRBANKS WHITNEY CORPORATION**

The electric motor is one of the most versatile sources of power ever developed. It is economical, practical and time-resistant. Fairbanks-Morse electric motors can turn out ½ horsepower or 10,000 horsepower, meet every known job demand within this range or be custom-specified to your blue-print projections. Whatever your production needs or plans may be, our electric motors can power them.

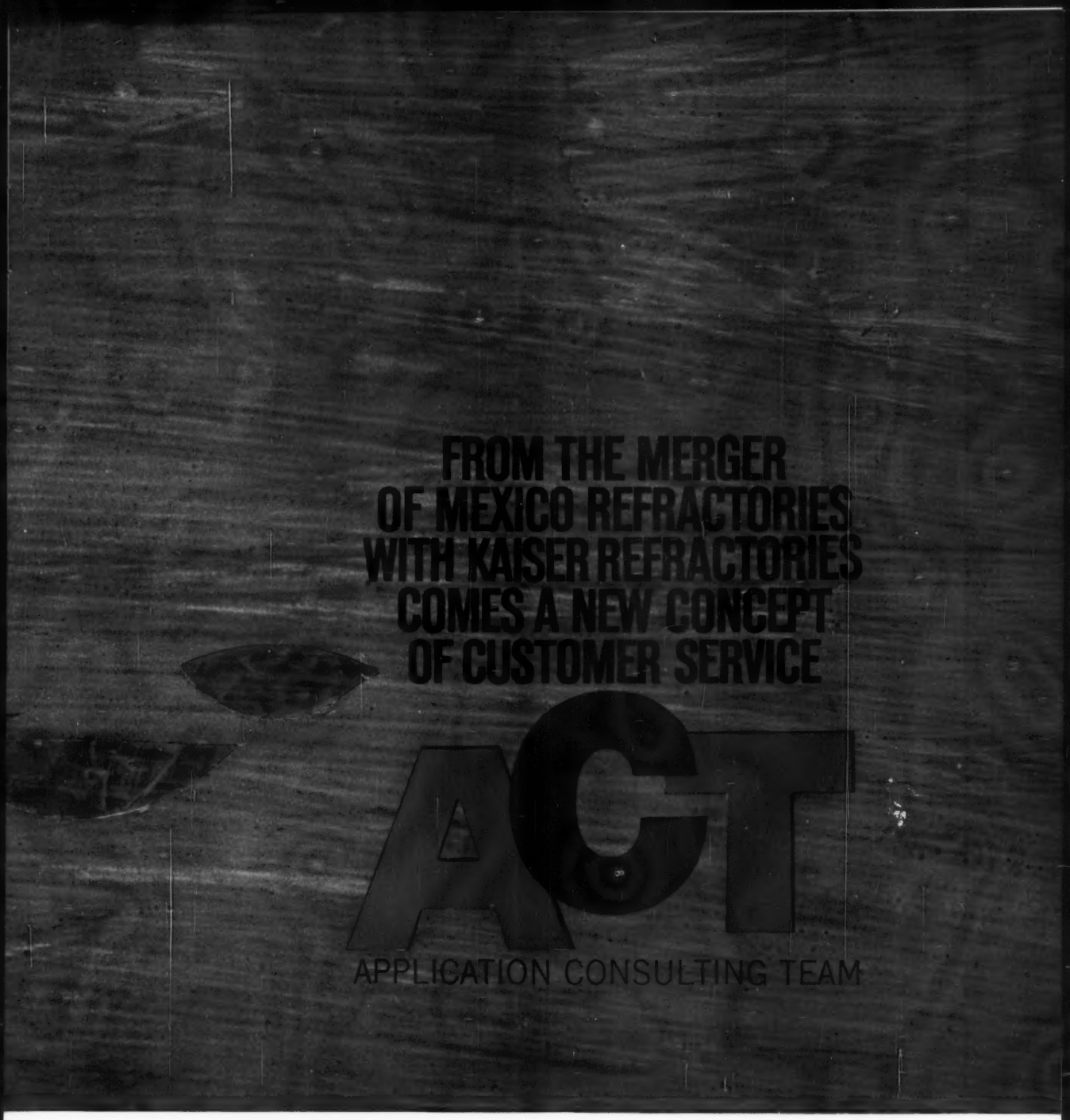
If you are in a field where power for production must be efficient, effective and dependable—we suggest that you consider our great variety of electric motors. For further information please write to: Mr. George H. Herrick, Vice President and General Manager, Electrical Division, Fairbanks, Morse & Co., Freeport, Illinois.

A SPECIAL KAISER REFRACTORY GROUP TO HELP YOU REDUCE REFRACTORY COSTS AND IMPROVE REFRACTORY PERFORMANCE

A C T has been created out of the merger of Mexico Refractories and Kaiser Refractories to help the steel industry profit fully from this outstanding fact: RECENT TECHNICAL DEVELOPMENTS HAVE GIVEN MODERN REFRACTORIES SUCH HIGH PERFORMANCE POTENTIALS THAT PROPER SELECTION AND USE IS NOW AS IMPORTANT TO ECONOMY AND EFFICIENCY AS THE TECHNICAL DEVELOPMENTS THEMSELVES.

We have seen this fact demonstrated again and again:

• When a steel producer was losing production time to premature taphole failure, A C T specialists helped establish a system of casting tapholes during ground rebuild. Here are the taphole performance results for the four



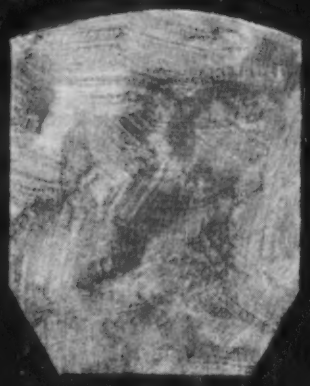
latest jobs: 125, 113 and 92 heats (250 ton furnaces), 80 heats (400 ton furnace).

• For blast furnaces that must be kept on the line to meet heavy production schedules, A C T specialists developed a technique for gunning repairs right onto the lining with K/R Blast Furnace Castable. Besides dramatic reductions in down-time, these repairs have extended campaign life up to 18 months . . . for about one-fourth the cost of brick repairs!

• To demonstrate savings through improved endwall performance, A C T teams compared furnaces using Kaiser Periclase-Chrome Brick to other furnaces in the same shops that were using other brick. Results? — longer service than any competitive brick used, with an average of 470 heats with endwalls of Kaiser Periclase Chrome Brick.

From hundreds of examples like these comes the purpose of A C T: To help you —through combined modern research facilities, expert knowledge of all types of refractory application techniques, and wide experience working with steel producers —to achieve lower refractory costs and improved refractory performance.

HERE'S HOW A C T IS ORGANIZED...



THREE GROUPS OF A C T SPECIALISTS

The A C T team is composed of three major groups of specialists within Kaiser Refractories:

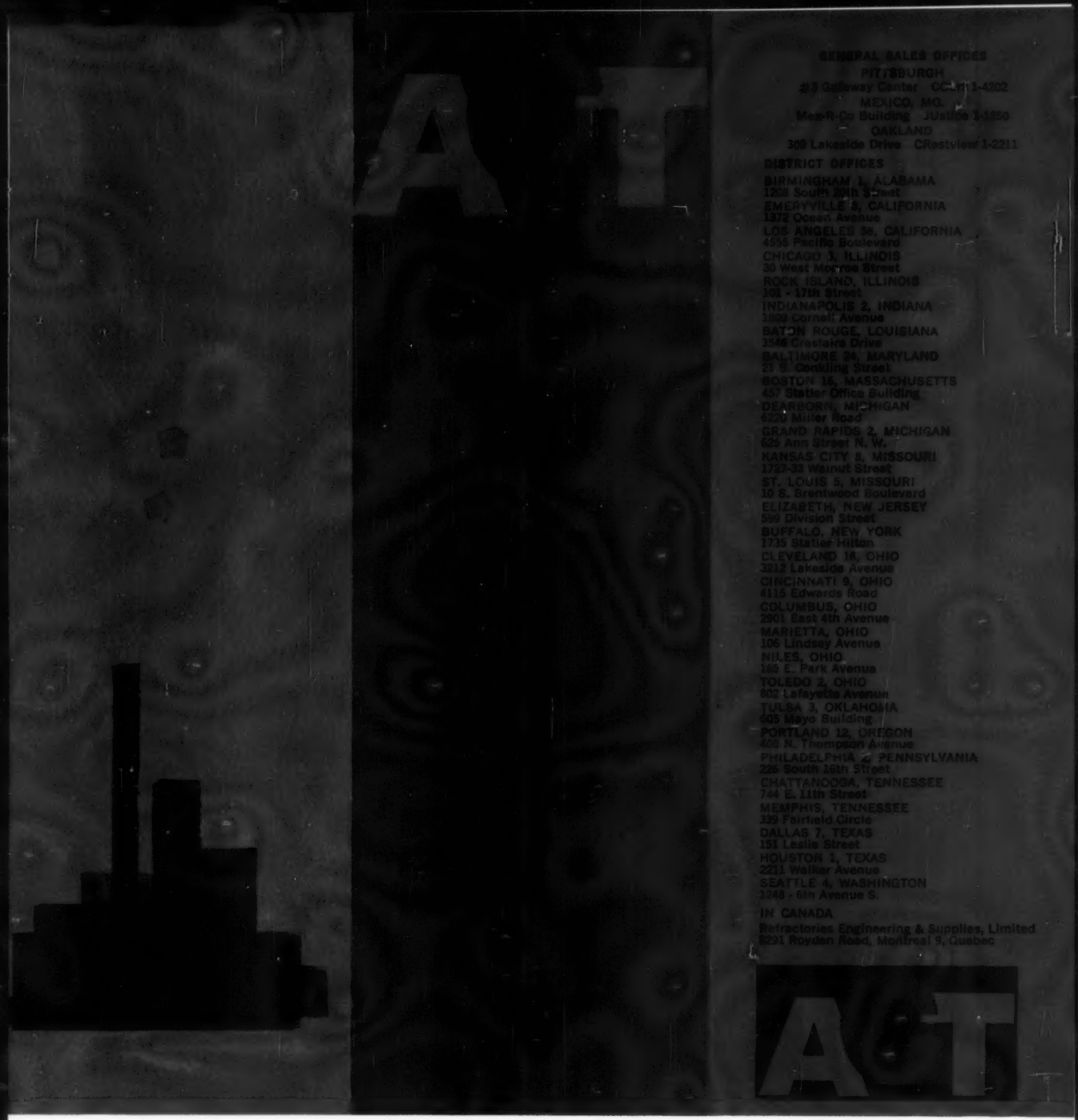
1. INDUSTRY ENGINEERING GROUP These sales engineers, many with supervisory experience within customers' industries, help evaluate your refractory needs. Calling upon combined technical services, they help create a complete refractories program fitted to your particular operation.

2. APPLICATION DEVELOPMENT GROUP These specialists bring to your operation a comprehensive working knowledge of up-to-date refractory application techniques . . . including survey, assistance in selection, detail drawings and actual installation assistance. With experience in virtually every type of refractory made, they offer you one source for all refractory needs!

3. REFRACTORY RESEARCH GROUP These specialists—with a 30-year record as pioneers of major advancements in modern refractories—act in an advisory capacity to the other two groups. In addition, this fully-integrated research service offers you the newest developments from combined research in basic, fireclay, alumina and silica refractories.

HOW CAN A C T SERVE YOU?

Over 100 A C T sales engineers



throughout the country are ready now to work with you directly—whether to answer an immediate problem or to plan toward desired future improvements. Your A C T sales engineer will call upon the services of A C T specialist groups according to the nature of your requirements.

You can take immediate advantage of A C T service by writing or calling "the man on A C T" at any of the Kaiser Refractories Sales Offices listed above.

KAISER REFRACTORIES

FOR FULL DETAILS, SEND FOR THIS FREE ACT BOOKLET MEX-R-CO High Alumina, Fireclay and Silica Refractories
Kaiser Periclase Brick, Mortars, Grains and Ramming Mixes

A C T, KAISER REFRACTORIES & CHEMICALS DIVISION KAISER ALUMINUM & CHEMICAL SALES, INC.
KAISER CENTER, 300 LAKESIDE DRIVE, OAKLAND 12, CALIFORNIA

Please send me a copy of the booklet, "A C T—To Help You Reduce Refractory Costs And Improve Refractory Performance." I understand there is no obligation.

Name_____ Company_____

Address_____ City_____ State_____

RW-300

the most field-reliable computer control system . . .

FOR AUTOMATIC CONTROL IN STEEL MILLS

Applied to the operation of a blast furnace, RW-300 digital computer control can result in a 2 to 4 percent increase in production rate or decrease in coke consumption. Measured over a year, such improvements in the return from *one* furnace can equal the investment in an RW-300 system. Similar cost reductions and production increases can be realized through computer control of sintering plants, open-hearth furnaces, oxygen converters, rolling mills, annealing and plating lines, and other processes in existing or new steel mills.

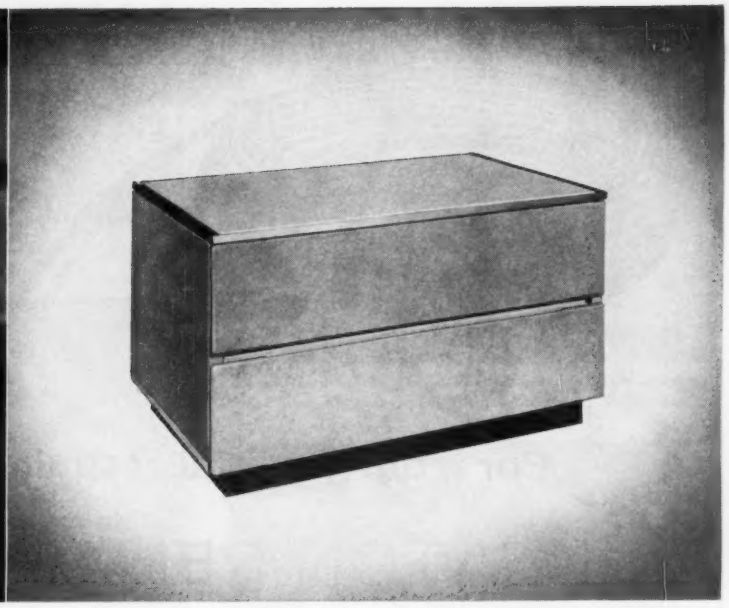
In an effort to boost profits by reducing costs and increasing throughput, many leading steelmakers are now considering computer control, and uppermost in their minds is the question of system reliability proven in the field. More than a dozen RW-300 systems are now operating around the clock in rugged industrial environments.

For further information, call or write Mr. Raymond E. Jacobson, Director of Marketing, Dept. S-1076-2.

THE THOMPSON-RAMO-WOOLDRIDGE PRODUCTS COMPANY

a division of ***Thompson Ramo Wooldridge Inc.***

202 NORTH CANON DRIVE • BEVERLY HILLS, CALIFORNIA • BRADSHAW 2-8892



Store fixture with customer-proof durability made of Clad-Rex® vinyl-clad metal

■ This island table, a combination counter and four-drawer storage unit, has proved its unusual durability in the busy aisles of one of the nation's largest chain of stores (name on request).

The reason—drawer fronts and side surfaces are made of Clad-Rex vinyl-clad metal. Where paint finishes chip and wear, Clad-Rex is virtually scuff-proof—practically maintenance-free! And there's styling, too—almost unlimited in color, texture and print! Jack Cannon, Plant Manager at Morton, says Clad-Rex "is no more difficult to fabricate than *un*finished metal".

See for yourself how *all* the other advantages of Clad-Rex vinyl-clad metals can improve both your product and production operations. Write today. No obligation, of course.

VINYL-METAL LAMINATES BY **CLAD-REX**® DIVISION OF SIMONIZ COMPANY

11504 W. King Street • Franklin Park, Illinois

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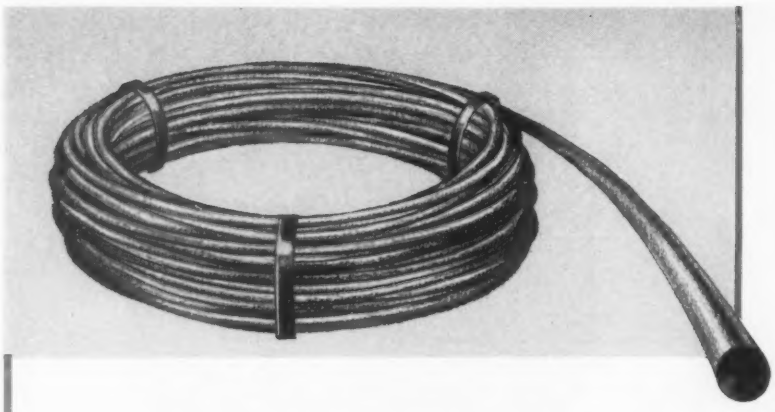
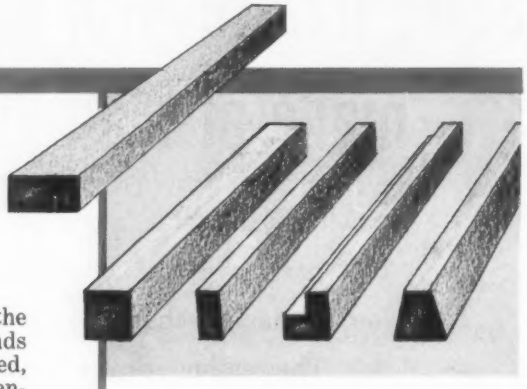


For Your Special Requirements Use

EATON-RELIANCE COLD FINISHED STEELS



Eaton-Reliance can furnish shapes in the range of .020" x .020" to ½" x $\frac{9}{16}$"—rounds up through $1\frac{1}{16}$" (coils or bars)—cold rolled, cold drawn special shapes—keystone—centerless ground, finished to your specifications. Produced by the most modern machinery under the most exacting quality control procedures, you can be assured Eaton-Reliance special steels will meet your requirements.

All steel finishing is done in our own mill by experienced craftsmen who draw and roll steel for ball and roller bearings —rings—springs—keys—pins and cold heading. Countless sections are available including round, square, flat, rectangular, step section, keystone and hex.

Eaton-Reliance also cold finishes several non-ferrous metals in addition to carbon, stainless and alloy steels.

Write for our 8-page catalog containing information about Eaton-Reliance cold finished steels and non-ferrous metals. No obligation.

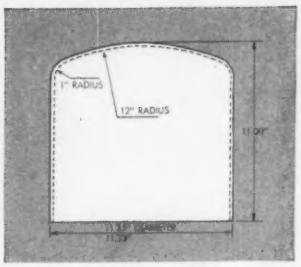
EATON

RELIANCE DIVISION
MANUFACTURING COMPANY
514 CHARLES AVENUE • MASSILLON, OHIO

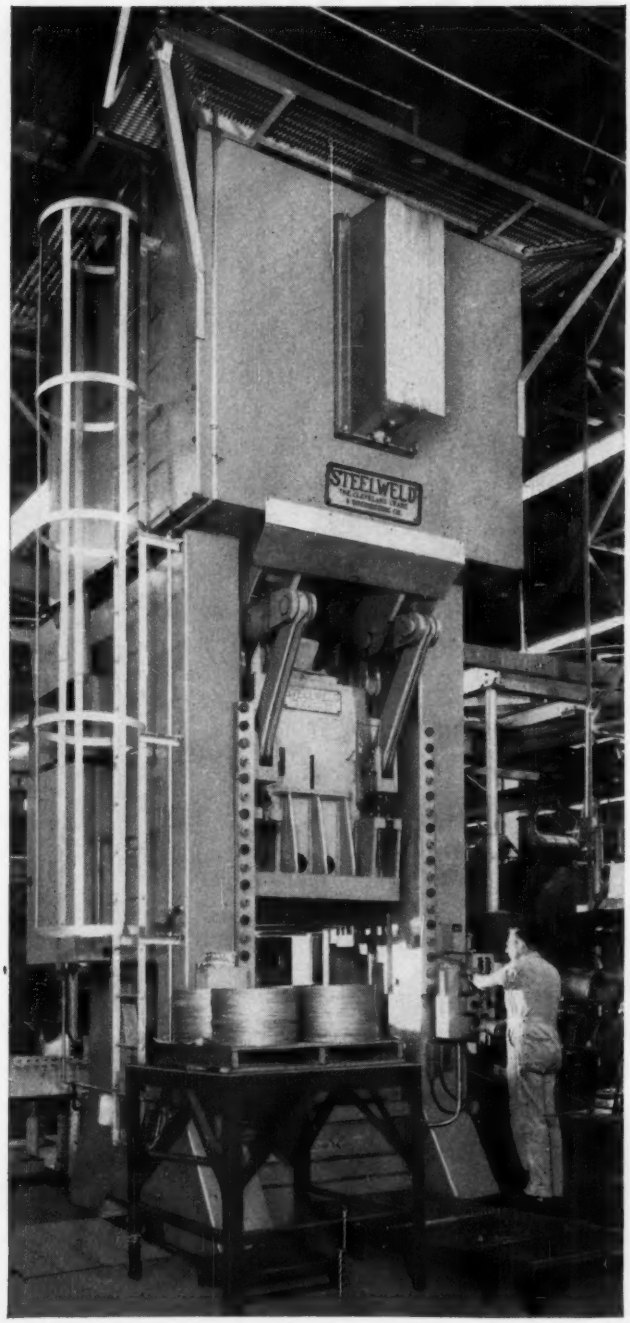
SALES OFFICES: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Los Angeles

DEEP-DRAWN SHELLS FORMED IN *SINGLE DRAW* ON STEELWELD SPEED-DRAW PRESS

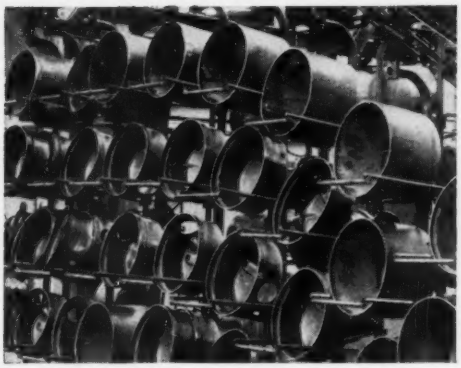
Draw Is Greater than 50% REDUCTION from Blank Size



This shell is stamped in a single draw from a 22¾ inch diameter steel blank. Material is 0.1644" draw-type steel.



Model D1-400-48-54 Steelweld Double-Action Speed-Draw Press rated 400 tons capacity with 48 x 54 inch slide area.



Some of the great number of shells produced daily. All dimensions are held accurately to specifications and the stampings are smooth and uniform.

A new kind of press with unique, patented toggle-eccentric mechanism stamps shells for air-conditioning units in a single draw from 22¾" dia. blanks to dimensions shown in sketch.

The unusual operating principle of the Speed-Draw Press permits making extra long draws at higher speeds than shallow draws can be made on a standard crank-type press. The deep-draw feature frequently reduces the number of operations required to form a part and often permits operations that are not possible on a standard press. Because of these advantages, parts can normally be produced at a far greater speed on a Steelweld Speed-Draw Press.

Write for free catalog No. 2029

STEELWELD

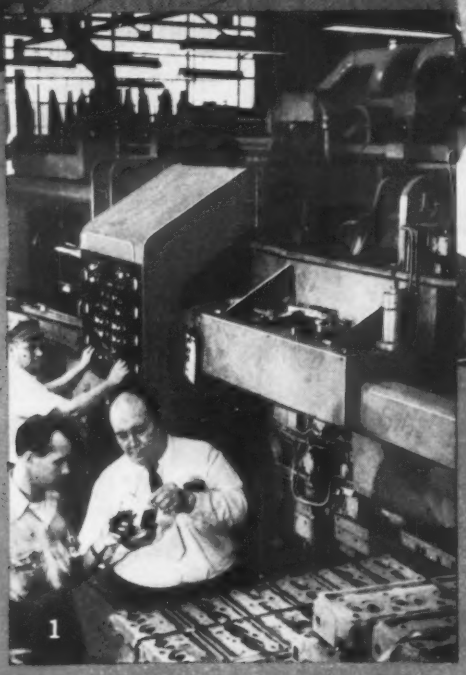
SPEED-DRAW PRESSES

Steelweld Machinery includes: Mechanical & Hydraulic Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

STEELWELD MACHINERY DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7803 E. 280 ST. • WICKLIFFE, OHIO

HOW
MOBIL
HELPS

American Motors set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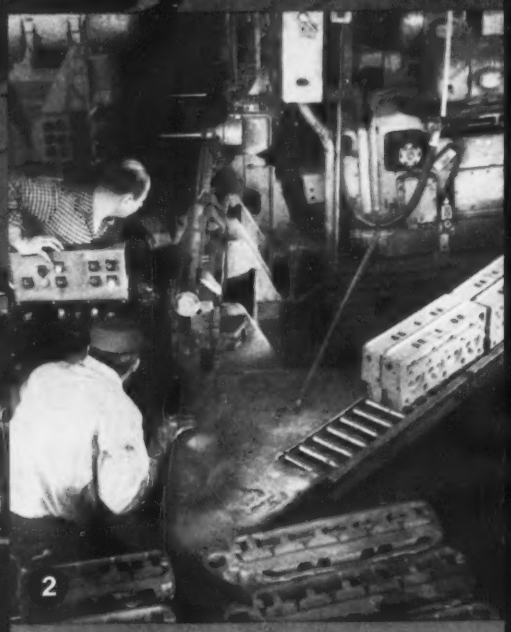

2

"The popular demand for Rambler Automobiles has resulted in sharply increased production requirements for our division. To keep our equipment running at capacity we have worked closely with Mobil Oil Company. This effort has been completely justified and has saved us considerable money."

MR. R. E. ANDERSON, *Superintendent, Motor Division, American Motors Corp.*

production records!

American Motors Plant at Kenosha, Wisconsin, fills increased production demands... reduces downtime... cuts labor and material costs!

Keep 'em coming! That's the order of the day for Rambler Automobiles, and production stoppages can be disastrous. When American Motors' far-sighted management anticipated production demands that would greatly exceed rated plant capacity, they promptly went about making preparations. Mobil was called in to insure correct lubrication for the highly critical production machinery in the motor division.

Mobil engineers, working in close cooperation with American Motors personnel, analyzed the lubrication problems posed by this record output . . . studied other problem areas as well. They recommended correct heavy-duty products, effective preventive maintenance procedures, techniques to reduce contamination and prolong lubricant life. As a result, machine downtime was greatly reduced, production availability sharply increased, and direct dollar savings to American Motors were achieved.

If you are interested in how Mobil may help you solve lubrication problems in your plant, call your nearest Mobil representative. Or write: Mobil Oil Company, 150 East 42nd Street, New York 17, New York.

1. An annual change of hydraulic oil was once the rule for this large machine which broaches top and bottom of cylinder heads. Mobil engineers felt oil usage could be extended, performed periodic analyses that showed oil could be used three years. Examining oil sample is Anthony Belasich, Assistant Superintendent.

2. This "transfer line" machines cylinder heads. Subsequent washing operations were hampered by excessive "soaping" of the cleaner. Mobil traced the trouble to the cutting oil then in use... recommended an equally effective, but less costly product that solved the problem.

3. To meet production schedules, American Motors runs its engine division 24 hours a day at full capacity. Overload caused frequent breakdowns on the critical transfer machines that drill and ream 6-cylinder blocks. Mobil recommended a correct heavy-duty lubricant, suggested periodic filtering of lubricant and hydraulic oil. Stoppages were drastically reduced. Discussing filtering procedure are Rudy Naiberg, Assistant Superintendent and Frank Zuerner, Mobil Representative.

Mobil

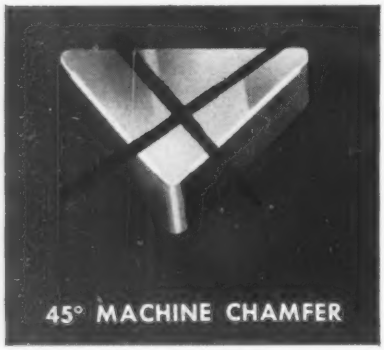
CORRECT LUBRICATION

MOBIL OIL COMPANY, 150 East 42nd Street, New York 17, N. Y.

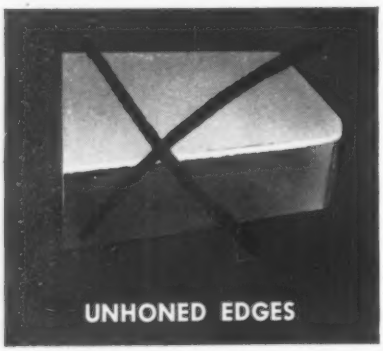
Metallurgical Memo from General Electric

GENERAL ELECTRIC ANNOUNCES PRE-HONED

Hand-honing is inaccurate, time-consuming—often results in premature chipping and breaking.



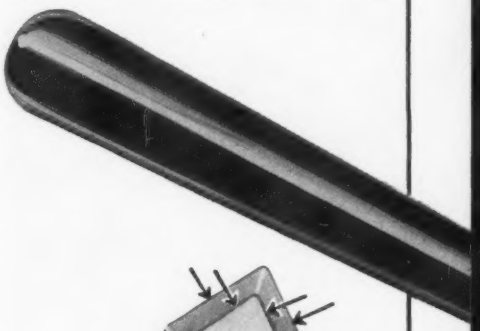
Chamfered, or ground-flat, edges are geometrically weaker than a radius and are more easily chipped or broken.

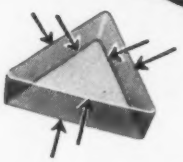


Unhoned or as-ground inserts show rough edges—result in unpredictable tool life due to chipping.

Now you get more predictable tool life... lower cost per cutting edge ... no hand-honing cost!

Pre-honed inserts with uniform, precise honed edges offer top strength; improve tool life predictability.





Because chipping and breaking are minimized, pre-honed Carboloy inserts result in lower average cost per cutting edge.

Additional savings result through the elimination of costly and often inaccurate hand-honing methods.

TOPS IN TOOLING QUALITY

From the research and quality-control facilities of the Metallurgical Products Department of General Electric comes the outstanding quality tooling line in the metalworking industry. The new Carboloy pre-honed inserts, as well as the complete line of Carboloy toolholders, inserts, insert seats, convertible seats, and brazed tooling, are designed to meet every tooling need efficiently and economically.

CARBOLOY® INSERTS

Delivered ready-to-use . . . honed to a precise radius . . . promise BETTER PROFITS THROUGH BETTER TOOLING

Now General Electric Carboloy inserts are pre-honed *at the factory!* Here's what it means to you:

1. An insert with edges honed to precise *radii* gives the strongest geometric shape to withstand cutting pressures. This reduces the chance of chipping—increases the predictability of tool life. Hand honing *cannot* achieve precise radii—G-E pre-honing can . . . and does!

2. Since chipping is minimized, fewer cutting edges are wasted. The result is lower cost per cutting edge.

3. Since inserts come pre-honed and ready-to-use, the labor cost and inaccuracies of hand honing are eliminated. This more than offsets the additional charge for pre-honing.

4. Pre-honed Carboloy cemented carbide inserts have standard edge radii honed to a greater or lesser degree, depending on the job to be done. You'll *know* the honing is right!

Ask your Authorized Carboloy Distributor about pre-honed Carboloy inserts, convertible seats, toolholders, and brazed tools. Or, write directly to: *Metallurgical Products Department of General Electric Company, 11141 E. 8 Mile Ave., Detroit 32, Michigan.*

Shown here, both under magnification and graphically, is an edge of the new Carboloy pre-honed insert. Radius is geometrically ideal to minimize chipping, extend tool life many times.

CARBOLOY
CEMENTED CARBIDES

METALLURGICAL PRODUCTS DEPARTMENT

GENERAL ELECTRIC

CARBOLOY® CEMENTED CARBIDES • MAN-MADE DIAMONDS • MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

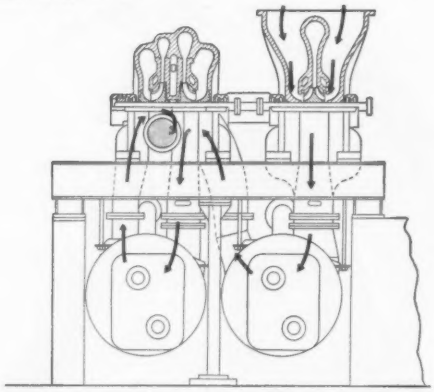
ANOTHER NEW DEVELOPMENT FROM INGERSOLL-RAND

Isometric drawing of new 60,000 cfm CVM compressor from discharge side – arranged for electric-motor drive through speed-increasing gear.

NEW intercooled centrifugal compressor provides 100-125 psi air at capacities to 60,000 cfm

Ingersoll-Rand's new intercooled CVM centrifugal compressor is designed to provide high efficiency and low operating cost for 100-125 psi air at capacities from 30,000 to 60,000 cubic feet per minute. Utilizing the service-proved design principles of the 5-stage CVM compressor, introduced by Ingersoll-Rand last year for capacities to 35,000 cfm, the new unit extends the advantages of isothermal compression to *twice* the capacity heretofore available.

This new, larger unit features a double-suction first-stage impeller in a separate casing, with single-suction second and third stages in a second casing. Both casings are horizontally split for easy access, and each casing has a separate shaft. The use of separate casings and shafts permits most efficient aerodynamic design and enables both rotors to operate below first critical speed. Efficient water-cooled intercoolers suspended beneath the compressor remove heat of compression, approaching the ideal condition of isothermal operation and substantially reducing power requirements. Ask your Ingersoll-Rand engineer for complete information.



Side elevation with top half of casings cut away, showing air flow through compressor stages and intercoolers.

Ingersoll-Rand

139-A-12

11 Broadway, New York 4, N. Y.

THE WORLD'S MOST COMPREHENSIVE COMPRESSOR EXPERIENCE

STEEL
The Metalworking Weekly

Metalworking Week®

June 20, 1960

Army Junks Johns Hopkins Machine Tool Study

The Army has rejected the recommendations of the Operations Research Office, Johns Hopkins University, to modernize the Army's machine tool program. The report (see STEEL, May 9, p. 102) suggests a five year, $175 million modernization program. The recommendations are "considered neither desirable nor justified," says the Army. Only a small part of the study (which said that by 1965 at least 90 per cent of the Army's tools will be at least ten years old) has been made public.

Steel Executive Ponders Foreign Competitors' Advantages

After visiting Europe, A. S. Glossbrenner, president, Youngstown Sheet & Tube Co., sees danger that the U. S. steel industry may soon find itself "on the outside looking in. It may not be long before we're out of the export business entirely." The trip convinced Mr. Glossbrenner that European steelmakers "have everything that they need, and many things that we don't have," namely modern, efficient steel plants, a large supply of highly productive labor at rates one-third those in U. S. plants, ample capital, and a more favorable government attitude, particularly in relation to taxes and depreciation allowances. He says the impact of the rapidly changing European steel situation will require "some important changes" in the attitudes of U. S. industrialists, workmen, government officials and others.

IUE May Ask GE for 3½ Per Cent Wage Boost

Although demands have not been announced, union sources in cities where General Electric has plants indicate that James Carey's International Union of Electricalworkers will ask for a minimum 3½ per cent wage increase during upcoming negotiations. The union wants negotiations to be opened earlier than the current pact provides.

Survey Spots Plans for Expansion in Second Half

In a survey of over 6000 metalworking plants, STEEL found that 28 per cent of the responding executives expect to increase manufacturing capacity in the second half of 1960; 72 per cent do not plan to boost capacity. Of those expanding, here's how it will be apportioned:

Plant size	New plants	Additions to plants	New equipment
Less than 100	10.0%	30.0%	60.0%
100-499	12.3%	28.7%	68.6%
500 or more	22.8%	35.0%	60.9%

Blough View of 1960: "No Boom, but High Activity"

"The current steel order picture is not a happy one," observed Roger M. Blough, chairman, U. S. Steel Corp., at the dedication of his firm's new

structural mill at South Works, Chicago. "But it seems to be bottoming out, and I think we will see a pickup early in August. This will not be a boom year but (one) of high activity." Commenting on the record imports of steel, Mr. Blough said tariff protection is not the answer. He urged that efforts be stepped up to make American steel costs more competitive, bring more ingenuity to bear in developing new products, and intensify marketing in this country and abroad.

Industry's New Look: Too Low and Too Long?

City planners are taking a second look at industry's modern profile — the low, rambling silhouette of today's plant. They are alarmed over rapidly dwindling industrial sites needed for "campus" type development. Planners in Northeastern Ohio, for instance, see only 6000 acres currently zoned for industry in their area (including Cleveland), and a need for 20,000 more acres in 20 years. A new study, "More Land for Industry," developed by Cleveland Electric Illuminating Co., offers area planners a guide to 300,000 acres with industrial potential. Says CEI's president, Ralph M. Besse: "We have misused good industrial sites, covering them with homes, while other areas, useless to industry, lie vacant."

Pre-engineered Buildings Carry 20 Year Roof Guarantee

Roofs guaranteed for 20 years are now available on pre-engineered buildings. Fabricated from a special sheet aluminum alloy, they were developed by Butler Mfg. Co., Kansas City, Mo., and Aluminum Co. of America. They're available in a variety of colors to match sidewalls.

New Power Source for Explosive Forming Developed

Battelle Memorial Institute says a new, safe, simple, and economical source of power for explosive forming has been developed by Dr. John McCallum of the institute. It's an electrolytic generator which turns out hydrogen and oxygen in mixture from water. When ignited, the gases explode to create pressure ten times greater than the starting pressure. The mixture can also be used in cutting and welding. Burning gases produce temperatures up to 3632° F.

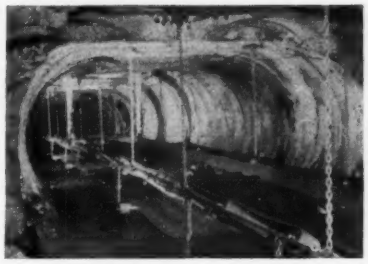
U. S. Eases Trade Restrictions with Russia

Despite the recent hotness in the cold war, the Commerce Department has expanded its list of items which can be shipped behind the Iron Curtain. Additions include building supplies, lead, zinc, antimony, chromite, sewing machines, refrigerators, vending machines, telephones, radios, office machines, certain surveying and engineering instruments, printing presses, surgical instruments.

Commerce Study Points Up Water Shortages

The U. S. will need nearly 500 billion gallons of water daily in 1980—70 per cent more than today, says a new Commerce Department study, "Water Use in the U. S., 1900-1980." The report affirms that we will have shortage areas. It says irrigation needs will jump to 178 billion gallons daily (from 127.5 billion in 1958), steam electric utility needs to 162 billion gallons (vs. 90 billion), industrial and miscellaneous needs to 115 billion gallons (from 56 billion), public water utilities to 32 billion gallons (from 20 billion), and rural domestic needs to 7.4 billion gallons (from 5.8 billion).

Midwest Steel Industry Gets New Coking Coal Source



The ceiling hung belt conveyor (right) speeds coal from continuous boring machines to the coal hoist bin in Old Ben Coal Corp.'s mine No. 21 which opened near Benton, Ill., last week. The mine is designed to make maximum use of automatic equipment. It holds 100 million tons of recoverable low sulfur coking coal. Old Ben says this reserve is the largest commercially available tonnage of metallurgical coal remaining in Illinois and believes No. 21 may be the largest producer of such coal in the Midwest by 1964. The company expects the steel industry in the Midwest to buy an increasing share of metallurgical coal from southern Illinois.

Plastic Trucktrailer Bows

A nonmetal trailer for commercial food hauling was introduced last week by Perfection Industries Div., Hupp Corp., Cleveland. Available for highway or piggyback traffic, the unit substitutes a stressed skin plastic laminate for the metal posts and beams of conventional "reefers" to cut weight and add bonus cargo space for refrigerated and frozen foods.

Mobile Home Industry Growing Market for Metalworkers

Builders of mobile homes are expected to use 25,000 tons of galvanized steel, 30,000 tons of aluminum, and 75,000 tons of structural chassis steel next year. Most of the materials will be purchased through warehouses, but mills may find this business attractive within five years if industry trends continue. The 377 mobile home manufacturers expect to make 152,000 units this year and 200,000 units annually by 1965, creating a small, but growing market for metals, components, and accessories.

Aluminum Distributors' Sales Slip

Directors of the National Association of Aluminum Distributors indicate member sales in the first four months of this year are about 2 per cent below those of the comparable 1959 period. But improved business during the

second half is expected to push annual sales 4 per cent above 1959's. Aluminum imports, which undersell domestic products by about 10 per cent, are hurting sales, particularly on the seaboard. Aluminum distributors handle 13 to 14 per cent of the aluminum mill products sold in this country.

May Unemployment Drops to 3.5 Million

Unemployment during May dropped to 3.5 million, down 200,000 from April, following normal seasonal patterns, reports the Department of Labor. Total nonfarm employment reached 61.4 million, a record. Much of the gain was in nonfactory lines such as services and construction.

FRB Index Turns Up First Time In Five Months

The Federal Reserve Board's index of industrial production rose to a seasonally adjusted 110 per cent of the 1957 average in May. That's up 1 point from April and a year earlier for the first increase in five months. The board said such consumer items as clothing, furniture, and television sets continued to increase while appliances turned higher after sharp declines in the first quarter. Auto output was also up and schedules for June indicate an additional moderate gain. Steel, coal, and crude oil production, however, declined.

Straws in the Wind

A U. S. Court of Appeals set aside a construction permit issued to Power Reactor Development Co. for the building of a nuclear reactor near Detroit, ruling that the Atomic Energy Commission had made insufficient safety findings in awarding the permit . . . Industrial plant investment projects in metropolitan Chicago totaled $98,141,000 in the first five months of this year against $74,748,000 in the corresponding period of 1959, reports the Chicago Association of Commerce & Industry . . . Athenia Steel Div., National-Standard Co., credits its $3 million expansion and modernization program with helping it to regain some markets lost to foreign mills . . . Sam Boddy Jr., director, Washington State Department of Commerce & Economic Development, has announced that Eastern capital is studying the feasibility of establishing a steel mill in western Washington and expects a decision soon . . . Pittsburgh Steamship Co. has laid up 13 of its 53 ship Great Lakes fleet of ore carriers because of lowered steel requirements.

Metalworking Pulse

The Business Trend: STEEL's industrial production index regained nearly all the ground it lost over the Memorial Day week, indicating a basic strength in the economy. **Autos:** With new car sales in May reaching a 55 month high, production schedules should continue at or above the current level until July 4. **Steel:** Look for the operating rate to hit the low mark of the year during the early part of July.

- **INDUSTRIAL PRODUCTION**
  - Week ended June 11 . . . **155†**
  - Year ago **174**
  - Details on Page 83
- **PASSENGER CAR PRODUCTION**
  - Week ended June 18 . **145,000***
  - Year ago **129,270**
  - Details on Page 80
- **INGOT PRODUCTION RATE**
  - Week ended June 19 . **62.3%†**
  - Week ago **61.6%**
  - Details on Page 146

†Preliminary. *Estimated.

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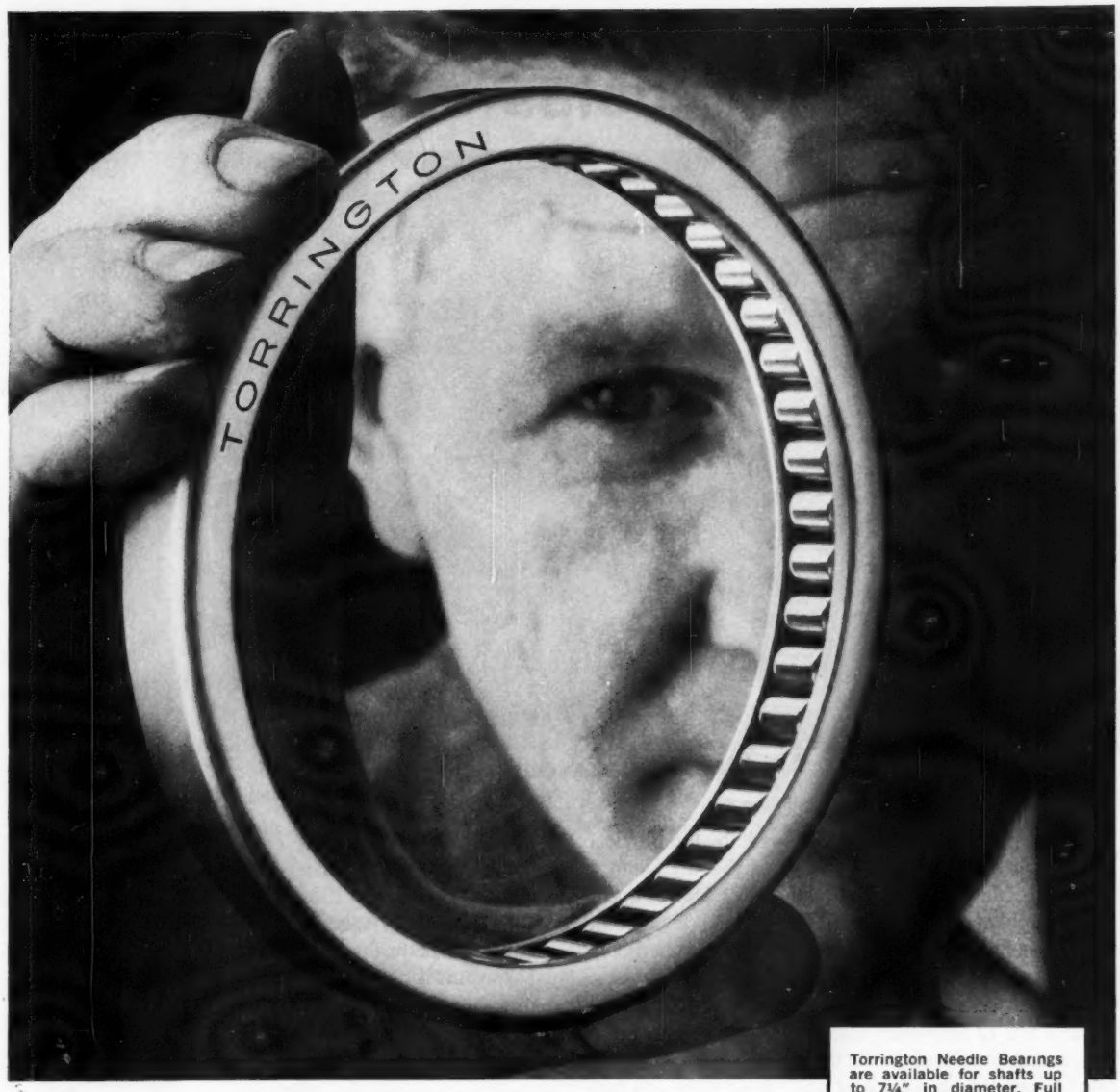


Torrington Needle Bearings are available for shafts up to 7¼" in diameter. Full complement of rollers provides highest radial capacity for a given cross section. They offer low unit cost, compactness and light weight and long service life. They take a press fit in a simple straight-bore housing, run directly on hardened shafts, permitting use of larger and stiffer shafts.

Why not put a Torrington Needle Bearing on that large shaft?

You have everything to gain by applying a large diameter Torrington Needle Bearing in your heavy duty applications.

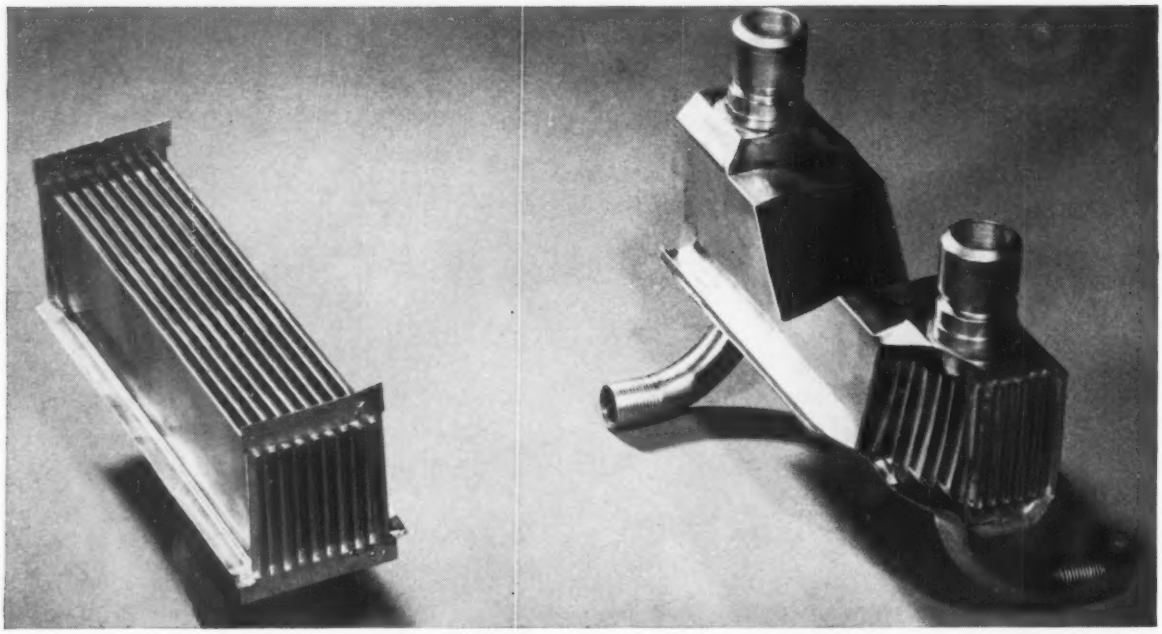
There's the unusual economy in price and installation cost over other anti-friction bearings of comparable size. Simplicity of design of related components saves even more. Unequaled capacity for a given cross section, good lubrication and efficient anti-friction operation mean long service life.

These advantages have been proved in performance in tractor bolsters, transmissions and final drives. In haybaler crank shafts. In power shovels. In heavy duty hydraulic pumps and starting motors. In road wheel arms on tanks. Why not talk over *your* application with your Torrington representative?

progress through precision **TORRINGTON BEARINGS**

THE TORRINGTON COMPANY Torrington, Conn. • South Bend 21, Indiana

Heat exchanger of Armco Stainless saves money, helps save lives



Blood and water are separated by the strong walls of the core (left) made from .005-inch Armco Stainless Steel. At right is a cut-away showing core in place in the case of Armco Stainless.

This tiny stainless heat exchanger made by the Surgical Instrument Company (Joseph A. Chyba and Sons), Baltimore, Maryland, protects human lives. During open-heart surgery, it cools the patient's blood to a point that surgeons consider safer. Even though it's used only once, it saves money compared with permanent types.

High tensile strength of Armco 18-8 Stainless Steel permits use of .005-inch thick core walls. These thin-gage stainless walls make the unit more efficient. In addition, Armco Stainless for case and tubes results in a unit that can be guaranteed sterile and pyrogen-free, and won't corrode in storage.

LOW IN COST

This unit costs less than a half-pint of blood, about $\frac{1}{20}$th as much as the cheapest of non-disposable units. It weighs only 7 ounces, compared to about 25 pounds for a permanent type. Moreover, the larger units take about a pint of blood to prime them and require thorough cleaning after use. This disposable unit can be used once, then thrown away at a saving for blood alone.

As in this unique heat exchanger, Armco Stainless Steels—sheets, strip, bars and wire—in more than 60 analyses and a broad range of gages, sizes, finishes and conditions, offer specific opportunities for savings and improved performance in thousands of products. Perhaps yours is one of them. Just mail the coupon for complete information.

Use the STEELMARK to identify quality steels in the products you make

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New steels are born at Armco

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ARMCO STEEL

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Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation

Lesson in Efficiency

Since our testimony on "The Impact of Foreign Competition" appeared in these pages May 2, we have been deluged with letters from metalworking managers. They say in essence:

You have outlined a grave problem.

Now, what can we do about it?

A few are faintly critical because we have not come up with a solution.

We only wish we could!

The problem is so subtle and complex that it defies any simple solution. We can only indicate areas of attack.

The first area, we believe, lies in bettering our production efficiency. That has been the subject of this publication's Program for Management during the last six months. The series of thirteen articles concludes in this issue on Pages 73-76.

In its simplest form, the program is a plea for metalworking to equip itself with the best machinery available and use it in the most efficient manner possible.

The coal industry offers an excellent example of what we have in mind. A few years ago, the industry was sick. Its production costs were high and being driven higher by wage benefit increases. Its markets were being raided by petroleum and natural gas.

The mine operators—with union consent—turned to improved mechanization —in mining, in preparation, in processing, in storage.

Today, we are the lowest cost producer of coal in the Free World, despite the highest wage rates and despite the sharpest rise in wage rates. Coal prices have edged up only 16.6 per cent in the last ten years, despite an 83.4 per cent leap in wage rates.

The U. S. miner produces 11 tons a day. In Europe and Russia, daily output per miner is generally under 2 tons.

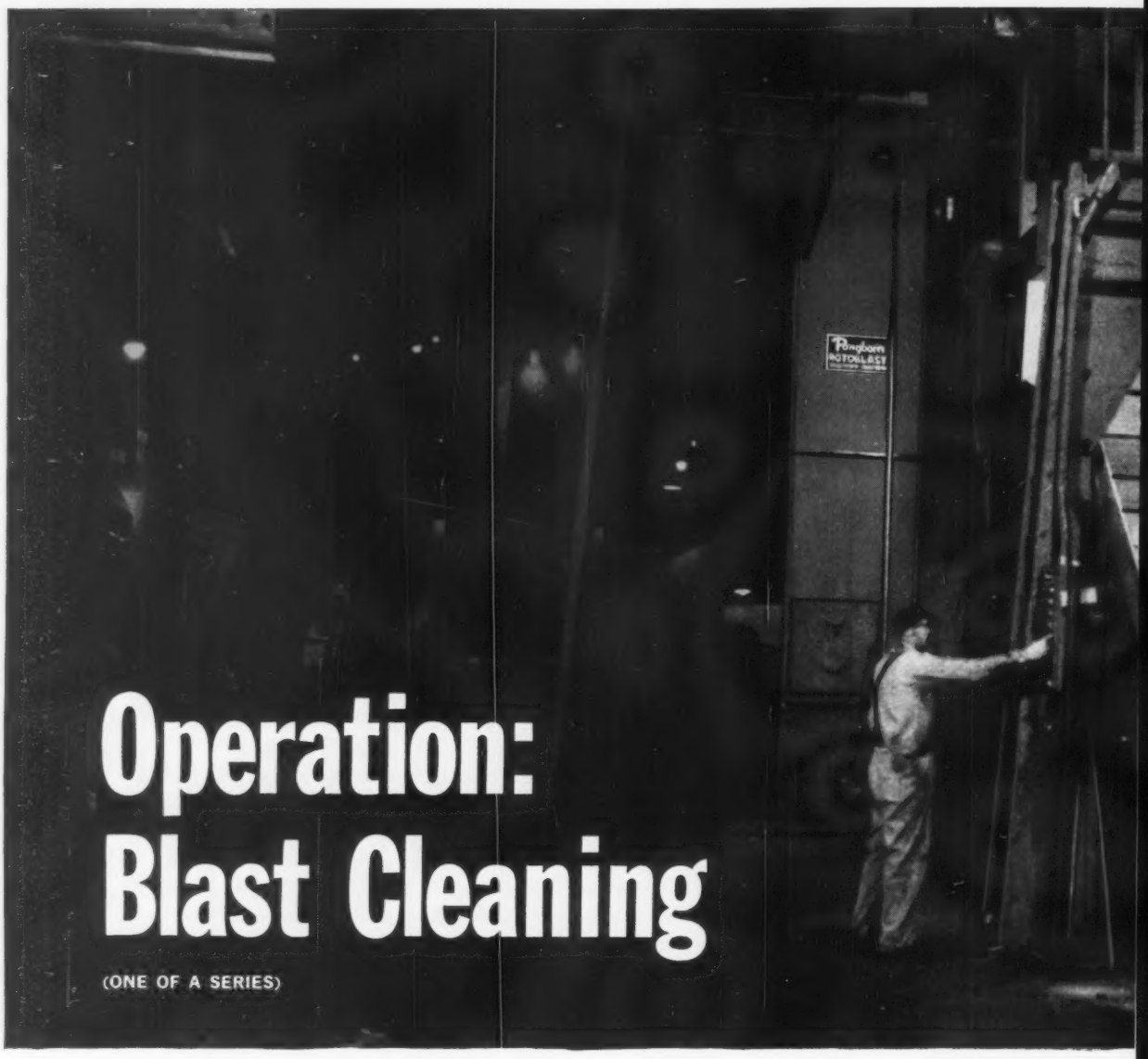
We exported more than 40 million tons of coal to Germany, Italy, France, and the Benelux countries, all low wage countries, in 1957.

Of course, the coal industry still has serious problems.

But we strongly recommend its lesson in production efficiency to all metalworking managers looking for practical ways to fight foreign competition.

Walter J. Campbell

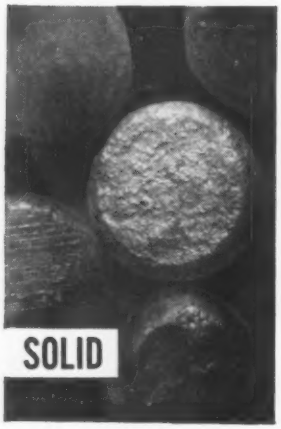
EDITOR



Operation: Blast Cleaning

(ONE OF A SERIES)

Pangborn Rotoblast proves itself again



Carrier Corporation, Syracuse, N.Y.—Pangborn Rotoblast cleans so quickly it has cut cleaning department labor costs 30% to 40% . . . saving $15,000 a year.

Master Electric Company, Dayton, Ohio—Two 12 cu. ft. Rotoblast Barrels with automation reduce labor costs by 50%—save $15,000 a year in manpower alone! Clean 33 tons of gray iron castings a day with ease.

Meadville Malleable Iron Co., Meadville, Pa.—Pangborn Roto-

And Rotoblast Steel Abrasives

In foundries, forges, steel and metal working plants all over America, premium quality Rotoblast Steel Shot and Grit are replacing other metal abrasives as they *prove* their ability to blast clean at lower cost. Lansing Drop Forge Co.—a typical

Typical Rotoblast Barrel, Ft. Pitt Steel Castings Co., McKeesport, Pa.

...and again...and again...and again!

blast cut 24 man-hours daily to 15 . . . cleans loads three times as large in half the time.

Ingersoll Rand Co., Painted Post, N.Y.—Pangborn Rotoblast cleans 74,000 lbs. of castings per day, cuts cleaning time in half and substantially reduces costs.

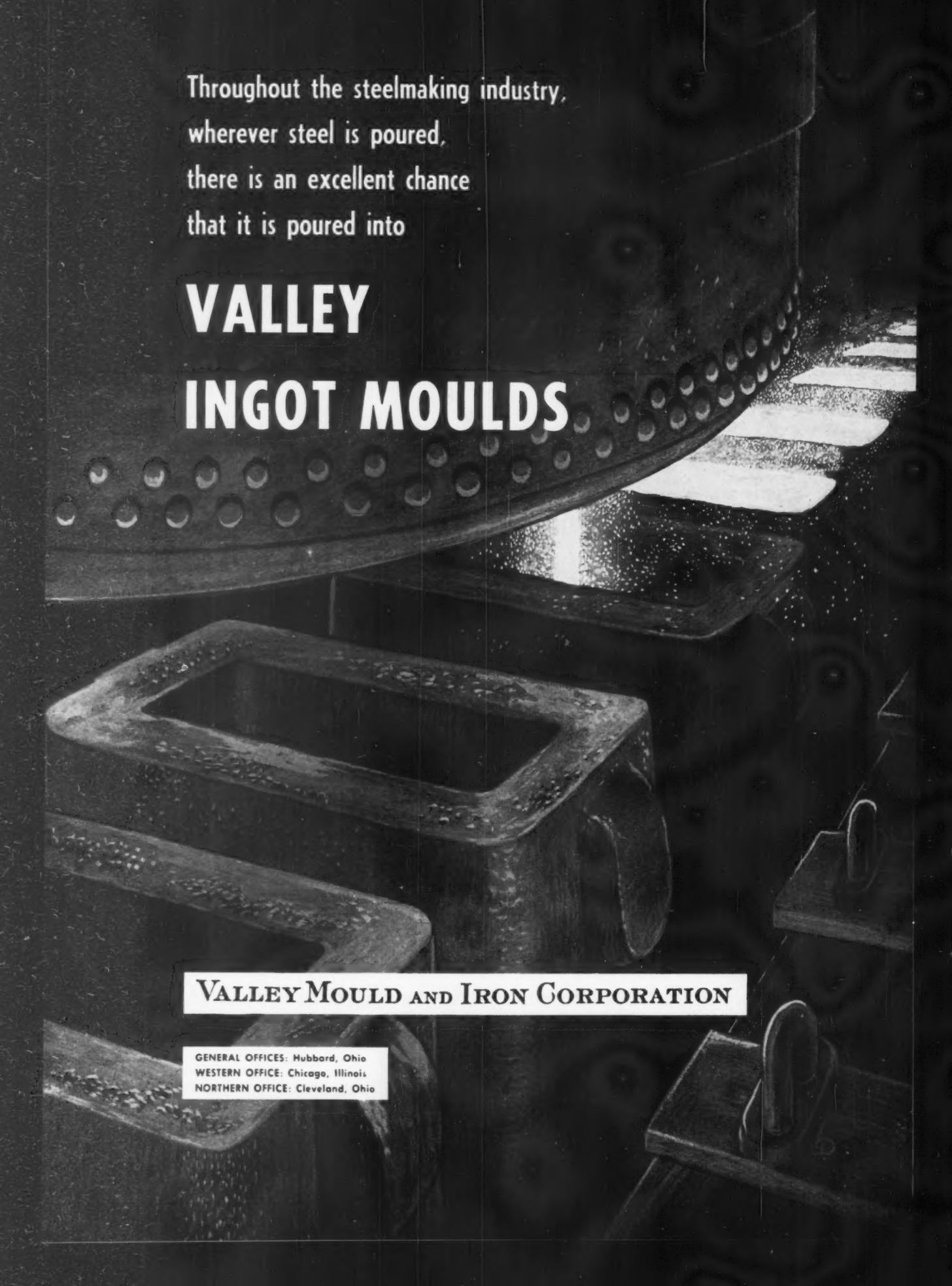
Buckeye Iron & Brass Co., Dayton, Ohio—Pangborn Rotoblast is automated to reduce labor requirements even further, cuts 15 minutes blast time to just 4½.

Results like these explain why two of the world's leading automotive manufacturers have just ordered *nine* 32 cu. ft. capacity Rotoblast Barrels! If your problem involves blast cleaning, talk to your Pangborn man or write PANGBORN CORPORATION, 1600 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning, Vibratory, Dust Control Equipment—Rotoblast® Steel Shot and Grit.®*

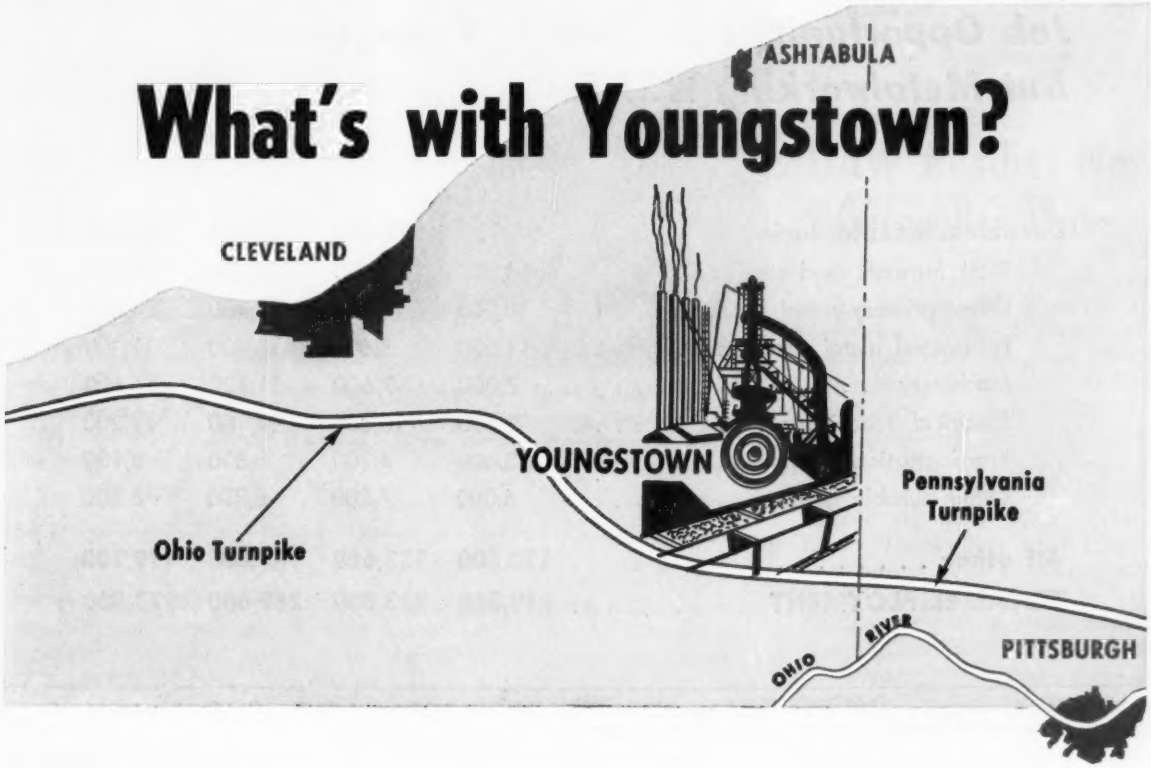
prove their value, too!

user—switched to Rotoblast S-390, cut abrasive cost by 23%. An Ohio foundry cut shot consumption from 27 lbs. per wheel hour to 7.8 lbs. with Rotoblast S-330. Let us show you what Rotoblast abrasives will do for you.

Pangborn
OF HAGERSTOWN


Throughout the steelmaking industry,
wherever steel is poured,
there is an excellent chance
that it is poured into
VALLEY
INGOT MOULDS
VALLEY MOULD AND IRON CORPORATION
GENERAL OFFICES: Hubbard, Ohio
WESTERN OFFICE: Chicago, Illinois
NORTHERN OFFICE: Cleveland, Ohio

What's with Youngstown?



The answer: Steel, its major industry, is hurting. That and other problems the Mahoning Valley faces parallel those of many other industrial communities — here's how the area is fighting back

NATIONWIDE ATTENTION has been focused on Youngstown in recent weeks because of the steep decline in its steel operating rate.

During the week ended June 5, output (including that of mills in the Canton-Akron area) slumped to 27 per cent of capacity. It was one of the lowest weekly rates for a nonstrike period in the district's long history. While the rate is back to 40 per cent, it is still some 20 points below the national average.

There are several explanations:

1. Because the district is a plus producing area (more capacity than consumption), it tends to lead and exaggerate the swings, both up and down, in the national operating rate.

2. Plant and equipment are older and less efficient than they are in many other, newer areas. When orders are slack, producers find it more economical to shut down Youngstown operations first, shifting production to more efficient equipment near by.

3. The area has four bessemer converters, which are usually among the first furnaces to be cut back during slack demand, especially for pipe.

4. The cost of raw material assemblage is higher than it is in many other places because of the lack of direct water routes.

5. The product mix is heavy on pipe and tubes, which are especially weak now.

6. Foreign competition, especially in oil country goods, is cutting demand from both domestic and export markets. The Venezuelan market is practically gone.

Despite those depressants, other areas of Youngstown's economy are holding up remarkably well. J. Paul Mossman, executive director of the Youngstown Area Chamber of Commerce, says auto sales in May totaled 1407 units compared with 1315 in April. Department store sales through May 28 were 5 per cent above the year-ago pace. Carl Ullman, president of the Dollar Savings & Trust Co., says his bank's delinquency rate on regular mortgage accounts is only 5 per cent, or about normal. "We have no distressed merchants," he says.

The Ohio State Employment Service reports that, except for basic steel, employment trends in general are holding up well.

One reason the economy is staying firm is the payment of state and industrial unemployment compensation. Paul Evans, staff representative for Local 26 of the United Steelworkers of America, points out that a worker with three or four dependents who normally makes about $3 an hour can get as much as $73.09 a week from com-

Job Opportunities to Grow in Youngstown . . . But Metalworking Will Lag*

	May, 1950	May, 1959	Projection 1970	1980
Durables Manufacturing	**98,900**	**99,400**	**113,000**	**127,300**
Blast furnaces and steel mills	50,500	47,000	45,400	49,000
Other primary metal products	10,200	14,200	18,400	24,000
Fabricated metal products	11,500	8,600	10,400	11,800
Machinery	7,000	7,600	11,100	14,600
Electrical machinery	9,500	10,600	12,100	12,200
Transportation equipment	3,400	4,200	8,800	8,900
Other durable goods	6,800	7,200	6,800	6,800
All other	**120,600**	**133,600**	**167,000**	**199,700**
TOTAL EMPLOYMENT	**219,500**	**233,000**	**280,000**	**327,000**

*Including Mahoning and Trumbull Counties, Ohio, and Mercer County, Pa.
Source: "The Economics of Downtown Youngstown," Hammer & Co. Associates.

pensation and earn another $8.40 without penalty.

• While a turn for the better in steel demand will quickly solve some of the short term problems (no sooner than August, most feel), the long term difficulties are not so easily brushed aside.

Foremost among those difficulties appear to be: 1. Industry doesn't have enough water to operate efficiently. 2. Organized labor isn't showing enough co-operation in the solution of some of the area's problems. 3. Steelmaking facilities require modernization. 4. The attitude of the community and local government toward heavy industry is described as "less than desirable." 5. More fabricating industries are needed to support steel mill output.

• The concentration of heavy industry along the Mahoning River is partly responsible for the water problem.

During summer months, the water is hot by the time it reaches the plants at the lower end of the stream.

One solution is the establishment of more flood control reservoirs, such as that proposed last November for the West Branch of the Mahoning. The added water could be turned into the river above Warren, benefiting industry throughout the basin, creating new jobs and protecting others, proponents claim. It could go a long way toward preventing flood disasters such as the one in January, 1959.

Mahoning County (including Youngstown) passed the bond issue. Trumbull County (including Warren and Niles) defeated it. Organized labor opposed the issue (it feels industry should pick up more of the tab) and was instrumental in defeating it again in Trumbull County in May. However, both industry and union spokesmen agree that eventually the reservoir will be built because the water supply is essential to the area's industrial growth.

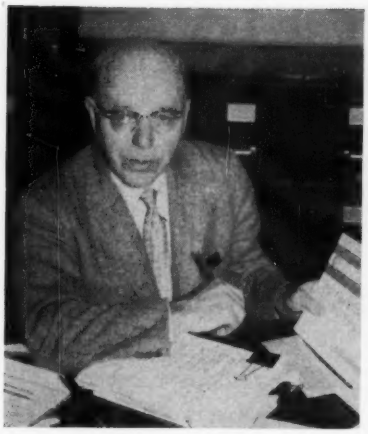
• Manufacturers claim that the union's insistence on passing the basic steel wage structure on to all workers, regardless of special circumstances, is pricing Youngstown out of the market.

A case in point is the aluminum extrusion industry. At its peak, there were 70 to 80 extruders in the valley, some observers claim. Now they say there are only 40 to 50. Some have moved South to cut labor costs, say industry spokesmen. Others have simply gone to the wall because they couldn't compete with outside producers.

But Carl F. Gangloff, executive secretary of the Youngstown Area Development Foundation, declares that, job for job, labor rates in his area are about in line with most others, especially where steel is a big factor.

A spokesman for the USW claims that many companies which have moved out of the area are coming back in. "They get cheaper labor outside, but they find they can't get the skills which are so plentiful in the Youngstown labor force."

Says Mr. Gangloff: "In 15 years with the foundation, over 450 new plants have come into our area. Only about 50 have moved out or folded. Companies like our central location—we're halfway between the major markets of Pittsburgh and Cleveland—and our



"We must compete with lower cost areas, or we die industrially," declares Kenneth M. Lloyd, secretary, Mahoning Valley Industrial Council

Youngstown Sheet & Tube's President A. S. Glossbrenner: **"Unless the business climate improves, the steel industry will not expand in this area"**

transportation facilities are improving with the completion of more superhighways. And there is an ample supply of labor with varied skills."

• Employers hope that a new era of management-labor relations was ushered in last month when Local 26 and the aluminum extruders signed a three year pact that enables the extruders to be more competitive with lower cost areas.

Kenneth M. Lloyd, secretary of the Mahoning Valley Industrial Council, claims that the agreement shows a change in labor's attitude. He also points out: The last contract with General Fireproofing Co., maker of metal office furniture, did not hew to the steel industry wage pact.

• Some of Youngstown's competitive disadvantages stem from its older facilities. Generally, the area has not benefited from the postwar expansion programs as much as such areas as Cleveland, Chicago, or the West Coast.

As one steel official puts it: "There is not enough money to go around to all facilities at one time. You put it where it will do the most good. However, one of these days, all three major producers in the Youngstown area (Youngstown Sheet & Tube Co., U. S. Steel Corp., and Republic Steel Corp.) will have to spend money at Youngstown if the mills are to be kept up." A. S. Glossbrenner, president of Youngstown Sheet & Tube, told STEEL that the current modernization of the 79 in. hot strip mill at the Campbell Works "is simply to protect the large investment we already have in this area."

• As an example of the city's attitude toward heavy industry, Mr. Lane cites the current attempt to collect a sewerage charge which could double industry's water bill.

Also, one city official is pressing industry to spend $42 million to clean up air pollution. Industry spokesmen say they have been conducting studies on this problem for some time, and they are aware of their obligation to the community. But some feel that $42 million is a high price to pay for a nonproductive improvement.

• But there is evidence that the city is awakening to its plight.

In April, 1959, the Youngstown Area Development Citizens' Committee was formed. It raised private capital for a study (by Hammer & Co. Associates, Washington) of the economics of the area. The report is being augmented by an implementing study by the City Planning Commission.

In addition to pointing up many of the problems mentioned above, the report projects Youngstown's economy 20 years. As the table on Page 64 shows, there will be considerable growth in job opportunities, but the greatest advances will be in nonmanufacturing industries.

UAW Readies New Whitecollar Drive

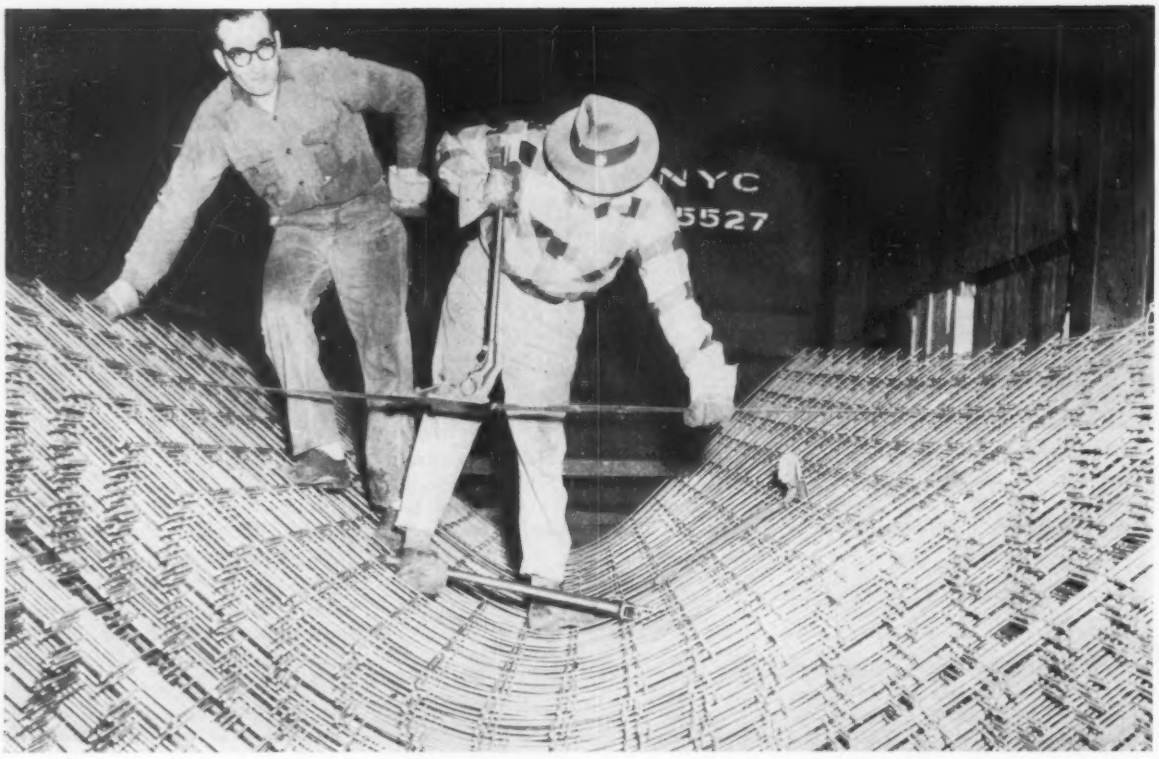
THE UAW plans a major campaign to woo 156,000 clerks and technicians in the five automotive companies later this year. But it won't have much luck if its most recent drive is any indication.

It apparently lost by a vote of 532 to 412 in an effort to sign up 1400 whitecollarites at Chrysler Corp.'s Trenton, Mich., missile plant. The decision is still in question because 130 additional votes have been challenged by the NLRB. Even if the union won, its victory would be a hollow one because many of the workers are expected to be laid off for lack of work. Chrysler has not received enough missile contracts to maintain full employment.

• Another Try—Despite that setback, the UAW's whitecollar program reportedly has reached the advanced planning stage. It now has 80 full time organizers. The group is headed by Brenden Sexton, a veteran organizer with 18 years of UAW service. He claims the time is ripe because office automation is forcing many whitecollar workers to think less of status and more of job security. Wally Webber, president of Chrysler's office workers Local 889, figures 1000 members have lost their jobs during the last three years because of computers and other electronic office equipment.

Hourly workers, once the union's backbone, are growing scarcer as automated production equipment takes over. In 1953, the UAW hit its peak membership of 1.42 million. The count is now down to 1.17 million.

At the same time, whitecollarites are on the increase. In 1942, office workers accounted for 14.9 per cent of the automakers' total employment. The figure has climbed to 21 per cent, or 156,000.



Wide reinforcing fabric won't fit flatwise into railroad gondolas. Sheets have to be sprung into a V shape. But first, wood supports have to be built into the car. The technique costs time and money, and the sheets take an unwanted

How an Industry Is Helping Itself

Makers of welded wire fabric are attacking four universal problems

IS your industry's capacity double your sales volume?
ARE the needs of some of your customers technologically ahead of some of your products?
ARE imports eating into your market?
IS your production equipment less efficient than it might be?

If you must answer "yes" to one or more of those questions, look at what producers of welded steel wire fabric reinforcement (often called wire mesh) are doing.

The fabricmakers could produce 1 million tons of material a year. But orders approximate only half a million tons. (Bulk of the capacity is in 16 companies, 15 of which are members of the Wire Reinforcement Institute Inc., with headquarters in Washington.)

A quick appraisal might indicate that the industry has overbuilt, or that it's not selling hard enough. In analyzing the dilemma, fabricmakers admitted, with reservations, to both of those faults. But they penetrated farther with these questions: "Is all the capacity of the right kind? Can we find additional uses for welded steel wire fabric?"

• **Payoff**—Analysis paid off in two directions. It helped the industry see that the size range of its capacity was inadequate and that a correction of the shortcoming would be an aid in catching up with the technological needs of customers.

In the quest for markets, the industry reasoned that the reinforcement its fabric gives to cement should apply also to asphalt resurfacing. Tests showed the reasoning to be sound. Sales departments followed up.

• **Found: A Market**—If the fabric does a good job in cement highways, why wouldn't it do equally well as reinforcement for "flat plate" cement floor slab construction in buildings? With a little promotional effort, the fabricmakers broke into this market a little more than a year ago.

The market seekers raised another question: "Why can't we tap more markets by making fabric of bigger wire and putting the wires closer together to make a heavy duty product?" Result: Now you can get ½ in. diameter wires spaced as close as 2 in. on centers in both direc-

curvature. To overcome the problem, two companies devised a hinge. Now the sheets can be folded, and loaded compactly, as shown on the truck. The folded fabric makes for easier manual handling at the job site

tions. While the maker, American Steel & Wire Div., U. S. Steel Corp., concedes that not many people would want the spacing so close, it did supply mats of ½ in. wire spaced on 5 in. centers for heavy jet runways and taxiways at Kinross Air Force Base, a new Air Defense Command installation on the upper peninsula of Michigan.

• **Pushed by Imports**—The drive for markets is all the more imperative now that imports are cutting in. Most of the fabric coming from abroad is of the commonest sizes; it is in rolls; and it is for building construction. Sizes are 6-6 10-10 (6 in. spacing of longitudinal and transverse wires, both of which are 10 gage), and 6-6 6-6 (6 in. spacing of wires, all of which are 6 gage). The material is 5 ft wide, and when unrolled, 150 ft long.

The imports sell for $25 to $35 a ton under the domestic product.

Another competitor is fabric made in the U. S. from imported wire. Several producers are in the Gulf Coast area, and one is at Kenosha, Wis.

• **Tied Together**—Solution of three of the problems (overcapacity, keeping up with technological needs of customers, and import competition) is dependent to a considerable extent on getting increased performance and efficiency from production equipment. The machinery must turn out a wider range of sizes of an improved product at increased speeds and with reduced costs.

Recognizing that, Keystone Steel & Wire Co., Peoria, Ill., put up a building to house an automated production line.

• **Saves Time**—The 191 ft long machine reduces time for size changeovers to 5 to 10 per cent of the time previously consumed and can produce 60 tons of fabric in an 8 hour day. The machine, built by National Electric Welding Machines Co., Bay City, Mich., will make fabric as wide as 17 ft or as narrow as 5 ft. Wire diameters can be as small as ⅛ in. or as large as ½ in. Wire spacing can be as small as a 2 in. by 2 in. square or as large as a 6 in. by 12 in. rectangle.

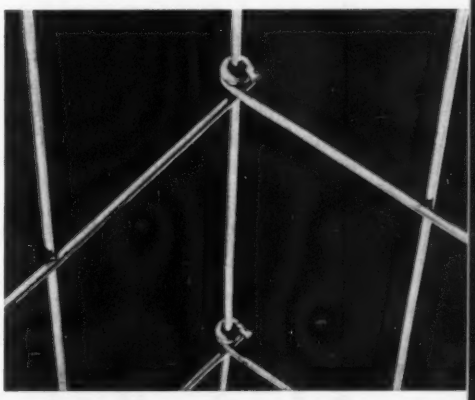
The new machine will automatically coil fabric and eject the rolls, or it can produce mats (also called sheets) which will be compactly stacked automatically and transferred for bundling.

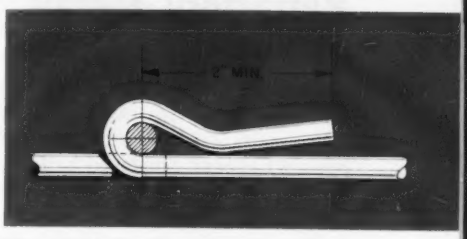
• **Innovation**—A feature of the machine is a mat turnover 40 ft long and 20 ft in diameter, which, by turning over alternate mats nests them together in a compact pile for shipment. Nesting cuts stack height by one-fourth, a compactness that pays dividends in shipping economy and convenience.

Before entering the turnover, the fabric passes through a slitter-trimmer and a shear. Depending on mat size, one of two transfer tables automatically removes the mat from the line of work for bundling. Both tables may operate simultaneously on split mats.

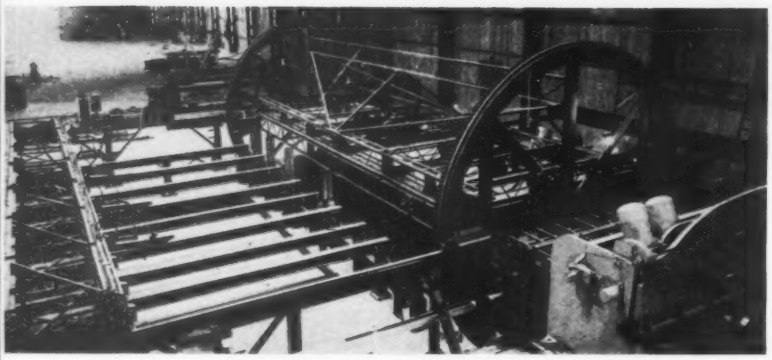
Fabric to be coiled passes through the turnover and is wound on a divided mandrel which retracts for unloading.

Supplying the wider fabric road





Here are the hinges two companies devised so that large sheets of welded steel wire reinforcing fabric can be folded for shipment and handling. At top is the hinge made by Pittsburgh Steel Products Div. of Pittsburgh Steel Co. The other one was developed by American Steel & Wire Div. of U. S. Steel Corp.



This mat turnover (20 ft in diameter and 40 ft long) being installed at Keystone Steel & Wire Co., Peoria, Ill., will compactly stack welded wire fabric as it comes off the welder

builders want poses a problem in trucking it to the job site (there are state regulations on load widths) and a problem in handling it on the job (the bigger material is unwieldy).

• **Hinges Developed**—For coping with those problems, hinges have been devised by two fabric producers—American Steel & Wire Div. of U. S. Steel Corp., and Pittsburgh Steel Products Div. of Pittsburgh Steel Co. AS&W is producing the hinged product at Donora, Pa., and Pittsburgh Steel Products is doing so at Monessen, Pa. The hinges are integral parts of the transverse wires.

The hinged fabric folds flat in approximately half of its full width. Thus, it can be stacked easily within the 8 ft width limit of a truck bed or gondola. The hinge eliminates the need for special cradle truck or other cradling equipment for shipping and provides easily handled bundles for lifting.

Trucks can be loaded with hinged fabric to the limit of their capacities, subject only to state weight limits. In first shipments from Pittsburgh Steel's Monessen Works, flatbed trucks accommodated loads up to twice the weight previously possible with ordinary road fabric.

• **Easier to Handle**—A single sheet of the hinged road fabric, folded and flat, can be handled by two men instead of the four normally required to manhandle unwieldy ordinary sheets.

Because flatness is preserved in shipping and stacking, hinged road fabric lies flat in place when installed. The technique eliminates time and work involved in restoring flatness to ordinary sheets that may have taken a "set" from shipping cradles.

• **Adds Storage Space**—To improve deliveries of welded wire fabric to its customers, Continental Steel Corp., Kokomo, Ind., constructed additional facilities to house stocks of fabrics.

Ivy Steel & Wire Co., Jacksonville, Fla., is getting a new wire mesh welding machine to manufacture fabric up to 8 ft in width. It is expected to increase the company's fabric capacity about 30 per cent.

To improve its ability to participate in the nation's highway construction program, Republic Steel Corp. installed a machine to make fabric 13 ft wide at its Gadsden, Ala., mill. Prior to adding the machine, Republic's maximum width for fabric was 9½ ft.

• **Unique Machine**—Republic's new machine and its two older machines are unique in that they are of the continuous flow method (welds are made while the fabric is in motion). Most fabric machines are of the step-by-step type. They weld while the mesh is stationary.

Principal markets for welded wire steel fabric are for reinforcement of roads, airports, buildings, and concrete pipe. But there are other uses. For example: It serves as sides for corn cribs.

Refractory Metals' Future Crystallized

A NEW ARC FUSION crystal growing process to produce refractory metals and metallic compounds has been developed by Linde Co., a division of Union Carbide Corp. Officials say it removes "a serious limitation on progress in the science and technology of high temperature metals."

Dr. G. H. Wagner, Linde's director of research, reports large, single crystals of tungsten, molybdenum, tantalum, columbium, vanadium, titanium carbide, titanium diboride, columbium carbide, molybdenum disilicide, titanium monoxide, and titanium sesquioxide (as well as other substances) have been grown.

Single crystals of tungsten are much more ductile and can be worked at much lower temperatures than presently available polycrystalline specimens produced by powder metallurgy or conventional arc melting, company scientists point out.

Crystals are produced as cylinders in diameters of ½ to 1 in. and lengths of a few inches to over a foot. Tungsten crystals ¾ in. in diameter and 12 in. long are being made. Larger crystals and other shapes are possible.

The arc fusion process is similar in some respects to the Verneuil flame fusion method used in Linde's commercial production of synthetic sapphire and star sapphire, rutile, and other oxide crystals.

A primary advantage of the Verneuil process is retained, the scientists say, in that no container for the molten substance is required. In the new process, important advantages are secured through wider range of temperature and atmospheres obtainable with electric arcs as opposed to combustion flames.

Division of National Steel Corp. reports construction of $100 million facility near Gary, Ind., is on target. Its annual capacity is rated at 840,000 tons

Midwest Steel to Roll in '61

THE Chicago area's supply of flat rolled steel products will be beefed up by Midwest Steel Corp.'s new, $100 million plant at Portage, Ind. (9 miles east of Gary). It's due for completion by July 1, 1961.

The facility will produce electrolytic tin plate, galvanized sheets, hot and cold rolled products. Annual capacity of the plant will be 840,000 tons.

Demand for flat rolled products has been consistently strong in the Chicago area, Midwest officials point out. The company's production is expected to increase supplies substantially and also sharpen competition among Chicago mills.

• **On Schedule** — Construction, started in August, 1959, is progressing on schedule despite delays caused by last summer's steel strike.

Initial employment will be 2200. An office building, completed several months ago on the 750 acre Lake Michigan site, is now fully occupied.

The Midwest plant is part of a three year, $300 million expansion program for National Steel.

Extensive improvements are also going into National's Great Lakes Steel Corp. facilities at Ecorse, Mich. To supply Midwest Steel's immediate semifinished steel requirements, Great Lakes is installing what has been described as one of the "fastest and most powerful 80 in., hot strip mills."

Other improvements at Ecorse are designed to increase open hearth capacity 500,000 tons. The new total will be 4.2 million tons.

• **Water Route**—Great Lakes Steel will be able to ship 70,000 tons of hot rolled bands per month to Midwest Steel. Great Lakes's plant, situated on the Detroit River, is a little more than 200 miles from Portage, Ind., by rail. Since Midwest facilities will be close to Lake Michigan, water shipment of semifinished products from Ecorse is considered a strong possibility.

• **Significance** — Pointing out the significance of the expansion program to the corporation, George M. Humphrey, chairman, and Thomas E. Millsop, president, declare: This program will contribute new elements of strength and operational balance to National in its three locations.

For example: It will enable Great Lakes Steel to meet peak demands of the auto industry.

In addition, they say, Midwest Steel will be able to provide increased service to the fastest growing steel consuming market in the country.

A substantial tonnage that is now shipped into the Midwest by Weirton Steel can be supplied to other markets which Weirton will be able to serve to better advantage.

• **Plans**—Will Midwest Steel's new facility eventually become an integrated steel plant?

Albert J. Berdis, president of the new company and Weirton Steel Co., says:

"In engineering a plant of this kind, you must naturally think in terms of its ultimate development. We have worked up the general design for such a plant. We have no present plan to build an integrated plant."

Europeans Hold Strongest Hand in the Coming Tariff Barter... There's Fear We'll Give Too Much Away

● EUROPEAN COMMON MARKET REVEALS PROPOSED NEW TARIFFS

	Proposed ECM Tariff	vs.	U. S. Duty on Import
Industrial or laboratory furnaces except electric	14%		11.5 to 25%
Rolling mills & rolls	13%		15 to 34%
Lathes	10%		15%
Boring machines	8%		15%
Milling machines	12%		15%
Electric welding machines	15%		13.75%

PROPOSED European Economic Community (common market) tariffs for six specific items of metalworking equipment are listed above. Comparable U. S. duties (also shown) reveal the problems U. S. negotiators will have at the September meeting of the countries participating in the General Agreement on Tariffs & Trade (GATT). U. S. negotiators will be arguing for a reduction in restrictions on many U. S. products entering foreign countries, but they will have to defend higher tariffs on foreign products coming into the U. S. (STEEL, June 6, p. 60).

The proposed common market changes will be the best cards in the hands of our overseas competitors. The Metalworking Equipment Division of the Business & Defense Services Administration (which revealed the tariff changes) says France and Italy will start lowering their tariffs in 1961 to meet the proposed common market standards, while West Germany and the Benelux countries will start raising their tariffs to meet the schedule. If adopted at the GATT meeting, the schedule would become fully effective in 1970.

● MOVE TO HALT U. S. TARIFF CUTS—Our GATT negotiators may be further limited in their ability to deal with other countries, if Congress adopts Senate concurrent Resolution 104. It proposes: No further reductions should be made in U. S. tariffs as a result of the GATT talks.

Sen. Gordon Allott (R., Colo.), Sen. Robert S. Kerr (D., Okla.), and others are sponsoring the measure. They think we will give too much away at GATT in view of our current import problems. Says Senator Allott: "Unless we make our international trade program work better than it does now, the whole structure will collapse."

Senator Kerr, second ranking Democrat on the Senate Finance Committee which has jurisdiction over tariff matters, is expected to move soon to get the resolution on the way through the committee. Then it would have to be O.K.'d by the whole Senate. At least 50 similar measures have been introduced in the House. It is the first time Congress has been so concerned with GATT talks.

● EFFECTS OF COMMON MARKET CHANGES—If the proposed tariffs are effected at the GATT meeting, you can expect some rather serious changes in the flow of U. S. exports to the common market, Washington observers say. In the first place, more trade will tend to remain within the six member countries because it will be free trade essentially.

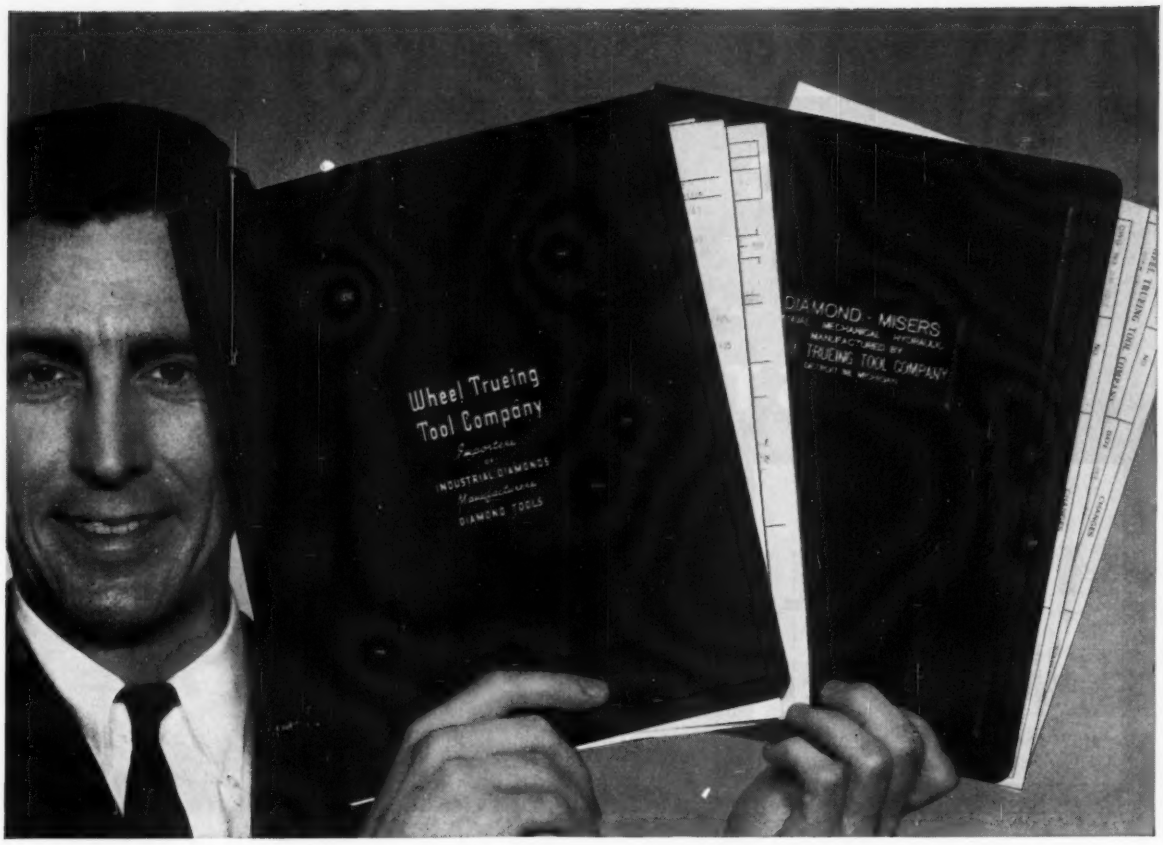
Secondly, the changes proposed for common market imports from outside countries are significant. On machine tools, for example, Italy's current tariff averages 14 to 17 per cent, while France's runs about 14 to 20 per cent. On the other hand, Germany charges only 4 per cent, while the Benelux countries charge just 6 per cent.

Metalworkers concerned about the tariff situation (either domestic or foreign) still have time to make their opinions known to the government. The Tariff Commission and the Committee for Reciprocity Information will hold public hearings on July 11. Those desiring to be heard should let the commission and the committee know by June 27.

● QUALITY STANDARDS FOR NO. 2 BUNDLES?—BDSA last week laid a proposition before a dozen or so top scrap people (yardmen and automobile scrap dealers). The agency wants scrapmen to work out a system among themselves which would produce No. 2 bundles with improved "acceptability."

Standards would set limits of ferrous and nonferrous content, density, size, and inspection. BDSA believes such standards are necessary because good scrap would be needed fast in the event of a shooting war.

Dealers who participated in the program, says BDSA, would be able to prove to their customers that their scrap is up to the highest standards.



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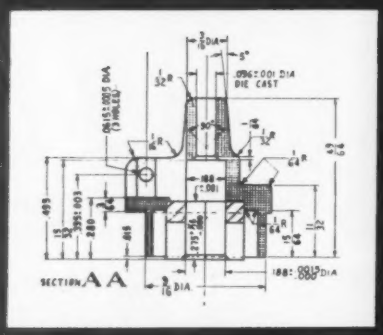

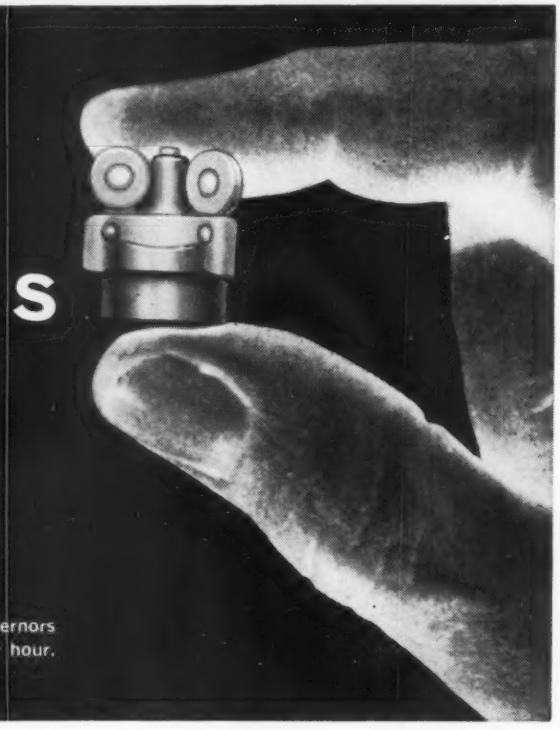

100 of these governors are die cast per hour.

Here is an excellent example of the design engineer's adjustment to the dictum: *In all business machines, space is at a premium.*

Used in a Burroughs desk-size adding machine, the miniature governor parts shown above had to be designed to fit into an extremely small space between the motor drive housing and the keyboard section. Consideration of the following factors led to the choice of zinc in the die cast design:

1. **HIGH SPEED OF PRODUCTION**
2. **ABILITY TO HOLD CLOSE TOLERANCES**
3. **STRENGTH AND DURABILITY**

The governors are cast in a two-cavity mold. After drilling and reaming the small holes, the parts are air-cleaned and assembled with steel pins and steel flyweights.

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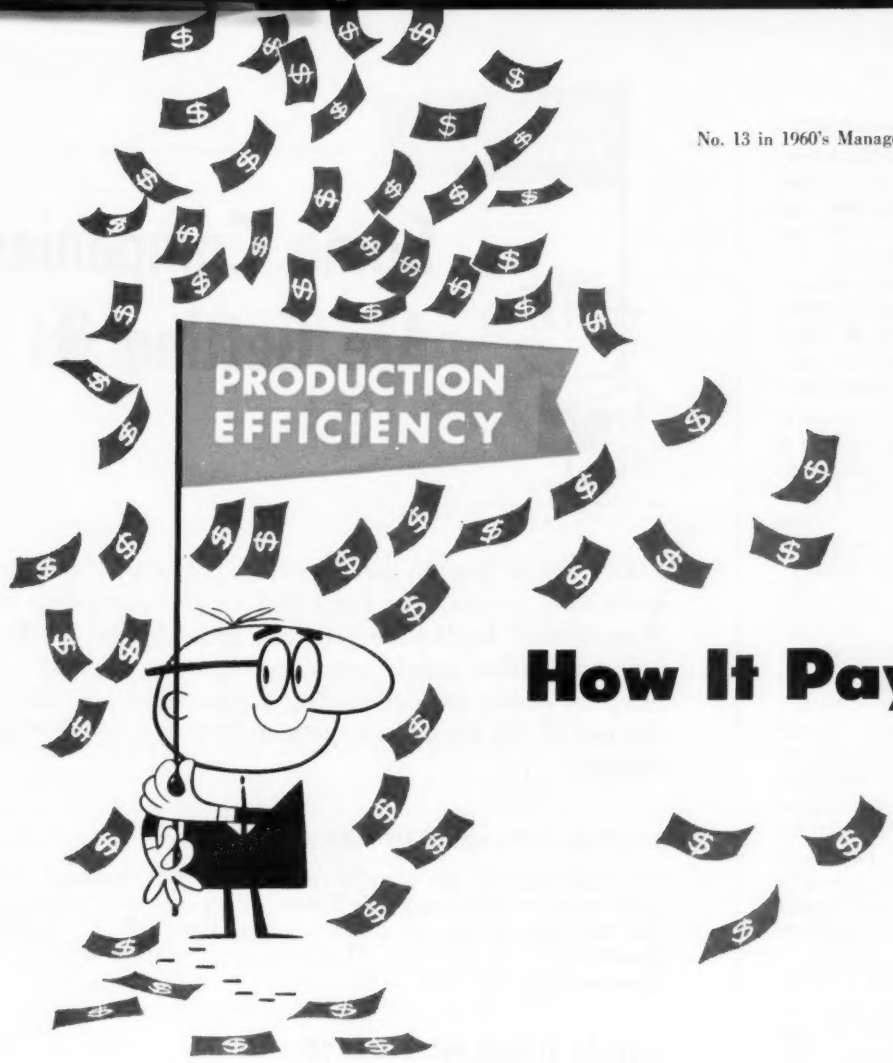


How It Pays Off

METALWORKING must face up to a $20 billion challenge to get optimum production efficiency.

The alternatives if industry fails the test:

1. Employment costs will continue to climb.
2. Inflation will get more severe.
3. Imports will rise, and exports will fall.

The consumer price index has advanced 18.1 per cent since 1950, and wages in the durable goods industries have vaulted 35.9 per cent in the decade. The increase in imports and decrease in exports in steel alone from 1957 to 1959 amount to 7 million tons of finished products, or 10 million tons of ingots—about 11 per cent of our 1959 production.

We can meet the triple threat with greater efficiency. More productive equipment is one of the best ways to achieve it. A STEEL survey of the managers who buy one-third of metalworking equipment indicates that metalworkers would spend $20.7 billion this year on machinery if they had unlimited funds. Their compromise is about one-fourth that amount.

STEEL has been exploring the answers to three questions in articles published since Jan. 11:

How can you plan your spending?

How can you boost outlays in coming years?

How can you get maximum benefits from the expenditures?

Here are highlights of the responses:

How to Plan Spending

The first job is to diagnose your equipment needs. Your company probably needs new equipment. It definitely does if it has one or more of the five danger signals of industrial cancer:

1. Your only means of offsetting added costs is to boost prices.
2. You're losing customers to competitive materials.
3. You're caught in a price fight.
4. Your profits fail to rise while sales are high.
5. You're losing markets to foreign competitors.

Other signs also suggest the need for more productive equipment: Rising maintenance expense, production bottlenecks and delivery delays, excessive idle time on machines, rising reject rates.

Fortunately, you can diagnose your own case—if you keep records, if you always question your methods, if you know what equipment is available, if you employ

good guides like the replacement formulas developed by Machinery & Allied Products Institute or National Machine Tool Builders' Association, and if you forecast your requirements well in advance.

Those things require organization. In a check by STEEL, machine tool builders could cite only 90 companies in the U. S. that have outstanding re-equipment programs. A cross section of 48 Cleveland firms turned up only 1 in 4 that organized its approach to equipment buying. Two of four had procedures on paper but didn't follow them. One in four had no specific method for evaluating and authorizing proposed capital equipment programs.

An organized program requires a capital spending budget and the breakdown of the kinds of expenditures. Most outlays arise because of the need to replace, expand, or retool. The methods of originating and evaluating replacement programs are different from those for expansion or retooling. Expansion and retooling proposals usually originate high in the managerial ranks, after marketing forecasts show the need for more capacity or new models. Since World War II, expansion and retooling have accounted for most of our capital spending, but now expansion, particularly, is leveling off, and replacement is becoming more important.

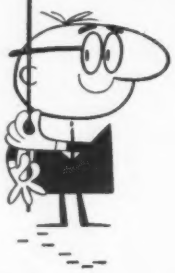
Replacement programs are, by far, the most difficult to start, judge, and get approved. That's why we'll concentrate on replacement for the rest of this article.

The plant superintendent, general manager, or foreman originates requests for replacement spending in 7 of 10 cases. Production middle management originates most requests in companies employing 200 or more. In smaller firms, top management assumes the duty.

Metalworking tends more and more to evaluate equipment proposals by committee, STEEL studies show. Some sort of executive group does the job in 30 per cent of the cases examined. Actually, some of the bigger companies have a whole series of evaluation points.

The person making the final decision on whether to buy equipment rarely does the evaluation. In nearly half the cases, the president

PRODUCTION EFFICIENCY



Some Companies Are Getting It.....

STEEL found that, in metalworking, production efficiency spells sales success. The firms that do an outstanding job of equipment buying are generally profit leaders in their industries. And nearly every industry has at least one company doing an outstanding replacement job. For a glimpse of the kind of competition you face, check these examples . . .

DOUBLED REPLACEMENT RATE

"In 1954, only 9 per cent of our cutting type machine tools were less than eight years old. Today, 16 per cent are. We've doubled the replacement rate. But I'm not satisfied."—D. U. Kudlich, manufacturing co-ordinator, Machinery Div., Food Machinery & Chemical Corp., San Jose, Calif.

INVESTS $10,000 PER EMPLOYEE

"We try to replace 10 per cent of our production equipment each year. In 1939, we invested $1000 per employee; in 1949, we invested $7000 per employee; in 1959, $10,000 per employee."—Carl Wedler, vice president, Wedler Bros. Inc., Cleveland.

AVERAGE MACHINE UNDER FIVE YEARS OLD

"The average piece of production equipment in our plant is less than five years old. We spent $6 million for production equipment last year; we'll spend $10 million in 1965."—J. V. Lester, vice president, Standard Pressed Steel Co., Jenkintown, Pa.

CUTS MACHINE AGE IN HALF

"There are 496 pieces of capital equipment in our plant. Average age is 8.3 years. In 1946, the average age was 19 years."—W. J. Artner, plant manager, National Machinery Co., Tiffin, Ohio.

FEWER MACHINES, EIGHT TIMES THE OUTPUT

"In 1932, we had 260 machine tools. Today, we have 194. But the 194 can produce eight times the dollar value of product that the 260 turned out."—Edson Gaylord, vice president and general manager, Ingersoll Milling Machine Co., Rockford, Ill.

....How About You?

In the last six months, have you changed, eliminated, speeded, combined, or simplified a production operation? _____

Do you know the age and condition of all your production equipment? _____

Do you keep detailed maintenance records? _____

Do you have an organized procedure for keeping up to date on new production processes and new models of machines? _____

Have you investigated numerical control and other innovations that contribute to production efficiency? _____

Do you ever lose money on a job due to high reject volume? _____

Do you ever have to refrain from bidding on a job because you can't meet tolerances? _____

Do you forecast your equipment needs for at least three years? _____

Do you have an annual capital spending budget? _____

Have you originated a new equipment proposal this year? _____

Have you sold a new equipment idea this year? _____

Do you know exactly what it costs to produce each of your products? _____

Do you know exactly how much is added to the cost of your products at each stage in its manufacture? _____

Do you have a good knowledge of your firm's financial position? _____

Can you name at least 12 sources for equipment financing? _____

Have you investigated leasing of production equipment? _____

Have you made any positive moves to get a better break on depreciation? _____

Do you give complete, precise specifications for special machines? _____

Do you always try to get special machines on a nearly standard basis? _____

Do you have an objective method of choosing equipment venders? _____

Do you keep labor informed of your equipment decisions? _____

approves or rejects proposals after the executive committee has made the initial evaluation.

The man evaluating the program usually does not have authority for approval.

The reason is the recognition of a need for a new and unconditioned final judgment.

How to Boost Outlays

When your capital spending program is well organized, half the battle is won for a continuing and perhaps increasing re-equipment plan for the years ahead. "We need a more systematic approach to keep our existing stocks of machines up to date," says C. A. Woodley, executive vice president of Caterpillar Tractor Co.

But the other half of the fight must still be waged. The tactics for that war are to sell your boss on the program. How do you do that? The odds will be in your favor if you follow this procedure used by successful equipment salesmen:

1. Know the facts. Have statistical proof that your equipment will more than pay for itself quickly (usually within five years).

2. Ask for help from associates. Many are experts in their fields and glad to help with your program —if asked to.

3. Make the pitch. Rehearse your presentation and use graphics (say models or pictures) that your boss can see.

4. Reassure the boss. Good salesmen have to cope with buyers' emotions that block a sale. These stand out: Fear of financial loss, of making a mistake, of taking a chance, of change, of the union, or of the future. Reassurance is the most common of many ways to overcome such fears.

5. Keep him sold. Most companies do the job with a postaudit system.

Any top official of a good company is eager for equipment proposals that will cut costs. That's part of his job. Any good president is also skeptical—on guard against unnecessary outlays. That's part of his job, too.

H. Thomas Hallowell Jr., president of Standard Pressed Steel Co., says: "Middle management must make top management aware that profits wisely spent within the

plant will be the key to greater output, lower costs."

But your proposals may be shelved (even though top management endorses them) because the company can't afford them.

What to do? Money is usually the special problem of top brass. Dare you step into that thorny area? You'll have to, at least part way, to keep an equipment buying plan on the track.

A general knowledge of the company's financial position will help you tailor proposals to improve chances of acceptance. A sound suggestion on how to finance the program may be just as important as a sales pitch on the equipment's cost savings.

Financing is usually hard to get, and it's rarely cheap, especially with today's high interest rates. Make the difficult matter of money easier with this plan of attack:

1. Be sure you really need money.

2. Know your firm's finances. Many middle managers don't.

3. Know outside money sources. Besides banks and insurance companies, at least a dozen other money sources are available.

4. Know the real cost of financing. It can add up to 50 per cent (or more) to the cost of equipment. And financing charges (or interest rates) can range from 5 to more than 25 per cent. A 10 to 12 per cent charge is common.

5. Consider alternatives to buying. They include: Leasing, which is almost always more expensive than buying but may save capital; rebuilding, which will save money but not give you the job a new machine would; buying used equipment, which has many of the advantages and disadvantages of buying a used car; and contracting out, which saves you from dealing with equipment, but you may lose some control over the product.

Still another way to keep your re-equipment program on a continuing and increasing basis is to join the fight for depreciation reform. The U. S. tax climate has severely buffeted our production efficiency. The bulk of spending for equipment is financed from depreciation reserves, but they are running short at the rate of $6 billion a year because of federal policies.

Our industrial competitors abroad have shown the way to legislative reform with laws far more liberal than ours. But in STEEL's opinion, Congress will not be convinced that thorough reform is needed until industry presents a more united front. The first step in that direction: Take full advantage of the depreciation laws on the books now. One in four companies, STEEL surveys show, doesn't use the new calculating methods which permit a greater return in the earlier years of an asset's life when depreciation is greatest.

You can help the cause if you:

1. Let your congressmen know how you feel about reform.

2. Sell the need for action to administration officials.

3. Modernize your own depreciation practices.

4. Seek greater unanimity on one proposal for reform.

How to Get Maximum Benefits

Even if you have organized your re-equipment program and even if you have solved your money problems, you still haven't solved the problem of production efficiency if you don't get maximum benefits from expenditures.

Good organization is a partial step toward maximum benefits. Another is good engineering. You can engineer for production efficiency by minimizing engineering costs (know your vender; play fair with him; give him time to do his job) and by maximizing engineering quality (do more manufacturing research; insist on high but reasonable performance guarantees).

Still another step on the way to maximum value for your equipment money is more careful selection of your venders. Accuracy, reputation, durability, service, delivery, and price are the keys to selection. Although price is important, it should be considered last in picking your supplier. In the early evaluation process, some companies don't let the evaluators know the price for fear it will color their judgment.

Another step forward is to sell labor on the need for production efficiency. Communications is all-important here. A word of warning: Keep communications simple. International Harvester Co. finds that it must go beyond its hourly workers in selling the need for greater productivity. Its lower and middle managers need periodic reminders too. So it holds annual company seminars on the subject.

Production Efficiency Pays Off

The exhibit on Page 74 shows how the drive for production efficiency has helped five companies.

How about industries?

Of all the segments of metalworking, manufacturers of nonelectrical and electrical machinery and instruments could be expected to show the greatest gains in productivity. That's their major sales story to customers, and they have to practice what they preach.

Here's how planned equipment spending will help increase productivity per manyear in those three industries over the next 20 years, as calculated for STEEL by Eddy-Rucker-Nickels Co., management consulting firm in Cambridge, Mass. (1947-49 = 100):

- Technological productivity in the electrical machinery industry will be 66 per cent higher in 1980 than it was in the base years.
- In nonelectrical machinery, it will climb 79 per cent.
- In instruments, it will jump 74 per cent over the next two decades.

Gains of at least that order are essential in all metalworking if we are to hold the line on employment costs and inflation and meet the impact of foreign competition.

Materials Efficiency

How to Get It

This is the last of 13 articles on How to Get Production Efficiency, running since Jan. 11. For a free copy of any or all articles in this Program for Management, write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

On July 4, STEEL will run the first of 13 articles in the second half of its 1960 Management series. They will deal with How to Get Materials Efficiency and will appear every other week for the rest of the year.

Here's proof of
OHIO MAGNET DEPENDABILITY

This Ohio lifting magnet operates under water 50 percent of the time, retrieving hot crop-ends from a cooling pit. It is a standard Ohio bolted-type magnet sealed with silicone rubber gaskets.

This unusual application proves the extra margin of protection built into every Ohio Magnet.

For longer magnet life and greater dependability, why not send your next order to Ohio—*leader in magnetic materials handling.*

Remember this picture next time you buy!

SELECT YOUR MAGNET
from 3 Ohio types: Bolted, welded and lightweight. Bolted types in all sizes from 25 to 65 inches; welded in 39 to 80 inches; popular lightweight sizes.

THE OHIO ELECTRIC MFG. CO.
5400 Dunham Road • Maple Heights, Ohio
Subsidiary of Howell Electric Motors Company
Manufacturers of electric motors up to 300 HP

Ohio ELECTRIC

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To gain more space, simply eliminate the separable race from a Hyatt Hy-Roll bearing. For Hyatt rollers will operate directly on any shaft or bore that you've hardened and ground to bearing specifications. But, first be sure you're using Hy-Roll bearings. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

Replacement bearings available through United Motors System and its authorized bearing distributors.

HYATT HY-ROLL BEARINGS

IN ROLLER BEARINGS HYATT IS THE WORD FOR GM GENERAL MOTORS RELIABILITY

First Half Auto Sales*

(Units)

	Standard Cars	Compacts	Imports†
January	354,012	101,137	40,420
February	377,116	106,475	42,704
March	436,726	139,238	50,310
April	418,531	159,039	51,000
May	422,240	144,000	52,000
June	443,000	147,800	48,000
Totals	2,451,625	797,689	284,434

*Anticipated. †Registrations.
Source: Adapted from *Ward's Automotive Reports.*

Ford Nudges Rambler In Compact Race

(Thousands of units)

Falcon	236
Rambler	229
Corvair	116
Valiant	98
Lark	61
Comet	57

*Projected to midyear.

Midyear Auto Sales Will Hit 3.5 Million

July is buildout month for 1960 models.

Compacts are taking a quarter of the market.

High inventories still worry dealers.

So do used car sales

BY NEXT WEEKEND, car dealers around the country will have sold 3.25 million domestically built cars and another quarter million imports to cinch 1960 as the industry's best year since record 1955. Motordom is now sure that sales will reach almost 7 million units. At least 6.3 million will be U. S. built.

The only concern is shown by dealers. They are still plagued with a million car inventory and September introduction of 1961 models. It's not likely that there will be substantial production cuts during July.

• **Big Six Sparking**—Compacts are helping the industry live up to earlier predictions. Their first half market penetration: 24.6 per cent of U. S. built sales. When imports are added, the economy cars account for almost a third of the market. Ford is clearly the winner in the compact car race. Falcon will edge Rambler in sales unless American Motors dealers are inspired this month. Comet, which Ford introduced in March, has also caught on. If it continues at present rates, it will outsell the Lark by the end of the year.

Metalworking has viewed the compacts with mixed emotions. Even though they've spurred sales, they use less steel than standard automobiles. One mill says that if all the cars sold had been of standard size, another three-quarters of a million tons of steel would have been used by automakers in the first half. But carbuilders are quick to point out that if there were no compact cars, there probably would have been half a million fewer sales in the first six months. More buyers would be purchasing imports.

• **Imports Still Strong**—As of now, imports have lost some market penetration, although not as much as Detroit anticipated. Foreign cars are accounting for 8 per cent of the market vs. 10 per cent last year. Even though sales will slump when 1961 cars appear in September, it looks like original estimates (500,000 import sales in 1960) will be met, possibly exceeded.

But the invasion isn't one-sided: Shipments of U. S. cars to overseas

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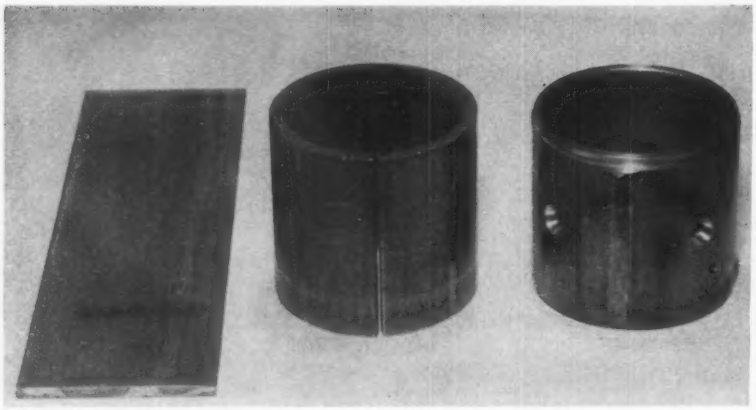
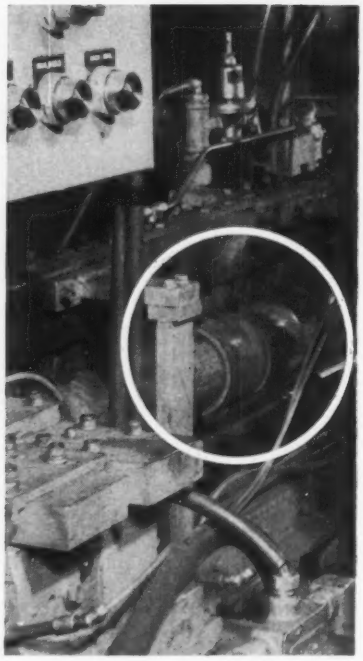




Chrysler Cuts Starter Shell Costs

SHELLS for starter motors usually are formed in a multidie press, welded, and machined by broaching or boring. Chrysler Corp.'s Indianapolis plant is using a nine station automatic machine that roll forms the shell, welds it under a submerged arc, then expands it to a finished inside diameter of plus or minus 0.0025 in. Unit savings are estimated at better than 20 per cent. The line was engineered and built by National Electric Welding Machine Co., Bay City, Mich.

Shell blanks go through a triple roll former and are rolled to a slightly undersized outside diameter. After degreasing and drying, the shell cylinders move automatically through an 18 ft high storage magazine, then down a narrow helical track to a conveyor line which carries them to the welder.

A pair of roller bars rotates the cylinders until the seam comes up. Knife edged wheels (see picture) drop into the seam to lock cylinders into welding position. A floating arbor and a copper alloy backup bar make it possible to get 100 per cent weld penetration without bleed through.

Cylinders are automatically loaded on the floating arbor like rings on a pole. They're squeezed together and driven continuously beneath a stationary submerged arc torch at a rate of 530 units an hour.

markets have picked up considerably. The Automobile Manufacturers Association reports that first quarter car exports were 39 per cent ahead of 1959's. It's assumed that the rate has held through the second quarter. If it continues, the industry will ship almost half a million vehicles overseas. About 60 per cent will be trucks. Last year, exports accounted for 311,321 units.

• **Standards Steady**—Chevrolet and Dart are two bright spots among the standard cars. Production and sales figures are equally good. At the end of five months, 815,000 standard Chevrolets have been built, says *Ward's Automotive Reports*. That's 85,000 more than last year and almost double Ford's standard production. More than 170,000 Dodge Darts have been built, and Dodge total output (191,000 units) compares with only 79,000 last year. J. B. Naughton, Dodge general sales manager, says 48 per cent of the trade-ins on Darts are non-Chrysler Corp. cars.

Buick, Pontiac, Thunderbird, and Mercury production is more than 10,000 units ahead of the 1959 pace. Cadillac and Chrysler are less than 10,000 units ahead of last year. Oldsmobile, Lincoln, and Imperial show slight losses. De Soto is down —15,000 vs. 26,000. Plymouth has dropped from 205,000 to 126,000 units through May.

• **Used Cars Off** — Motordom expected compacts to put the squeeze on used cars. Sales are only slightly behind last year's but inventories are around 900,000, almost 125,000 above the year ago level. The wholesale auction price average on used cars has slipped steadily all year.

U. S. Auto Output

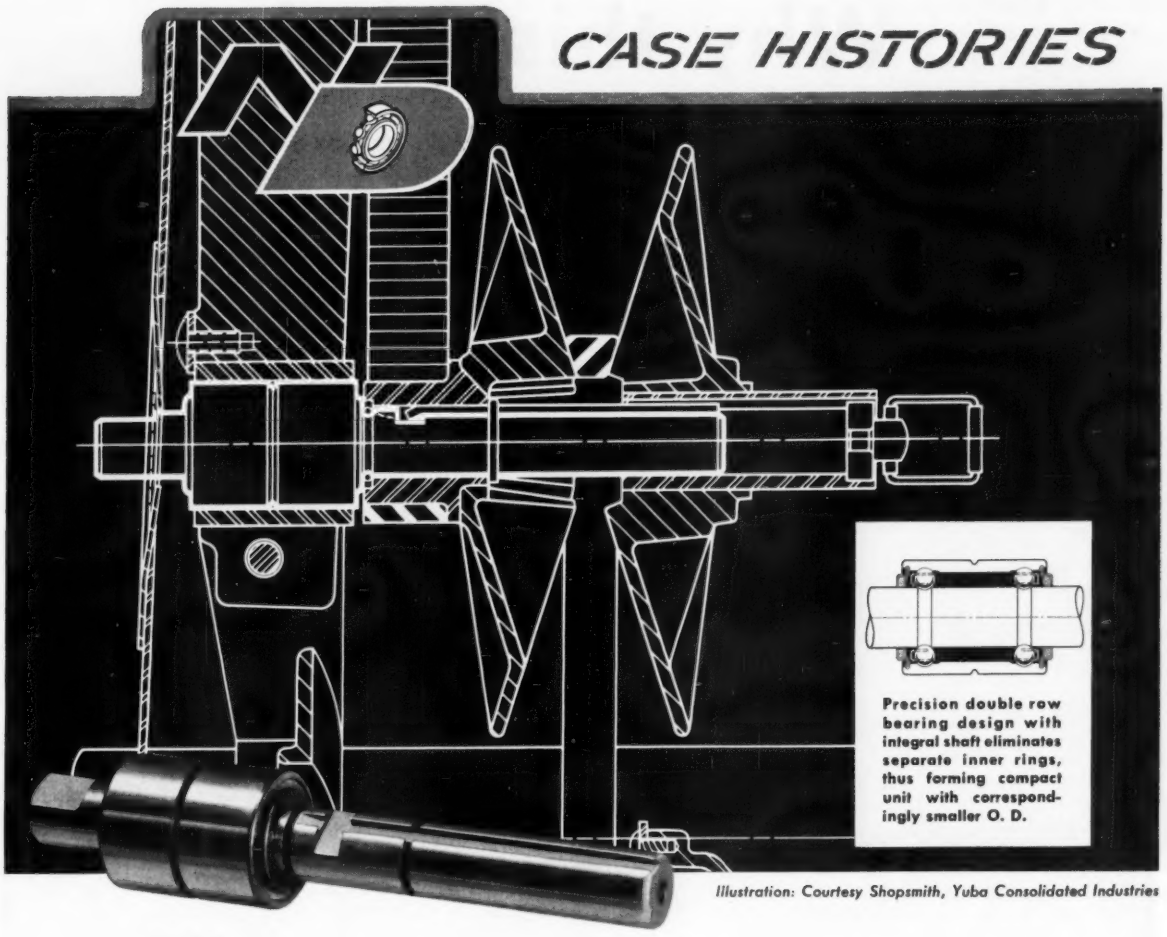
Passenger Only

	1960	1959
January	688,731	545,756
February	659,323	478,518
March	654,242	576,080
April	582,909	578,846
May	611,226	546,817
5 Ho. Totals	3,196,431	2,726,017
June		557,995
July		555,410
August		239,149
September		258,151
October		507,527
November		254,527
December		494,931
Total		5,593,707

Week Ended	1960	1959
May 14	145,917	135,856
May 21	154,755	133,568
May 28	142,359	117,372
June 4	115,068	125,186
June 11	141,838†	127,029
June 18	145,000*	129,270

Source: *Ward's Automotive Reports*.
†Preliminary. *Estimated by STEEL.

CASE HISTORIES



Precision double row bearing design with integral shaft eliminates separate inner rings, thus forming compact unit with correspondingly smaller O. D.

Illustration: Courtesy Shopsmith, Yuba Consolidated Industries

N/D Bearing Solves Home Power Tool Speed Changing Problem!

CUSTOMER PROBLEM:

Require low cost, compact idler shaft assembly for speed changer in popular, multi-purpose home power tool. The assembly must mount on ball bearings . . . operate at speeds up to 6000 RPM.

SOLUTION:

N/D Sales Engineer, cooperating with customer engineers, recommended a *single* N/D ball bearing —a compact integral shaft unit designed as part of idler assembly. The unit permits one of two interlocking variable pitch pulley halves to slide axially on shaft when changing pitch at high speed. This precision, automotive type fan and water pump bearing eliminates extra parts inventory and shaft machining . . . reduces assembly time. In addition to solving complex design problem, N/D's compact heavy-duty ball bearing is integrally sealed for protection against saw-generated dust . . . and lubricated-for-life for added end user sales appeal!

If *you're* designing new equipment, why not call your New Departure Sales Engineer. He probably can help engineer your application with a standard, volume-produced N/D ball bearing that will help solve your bearing problem. For more information contact New Departure Division, General Motors Corporation, Bristol, Connecticut.

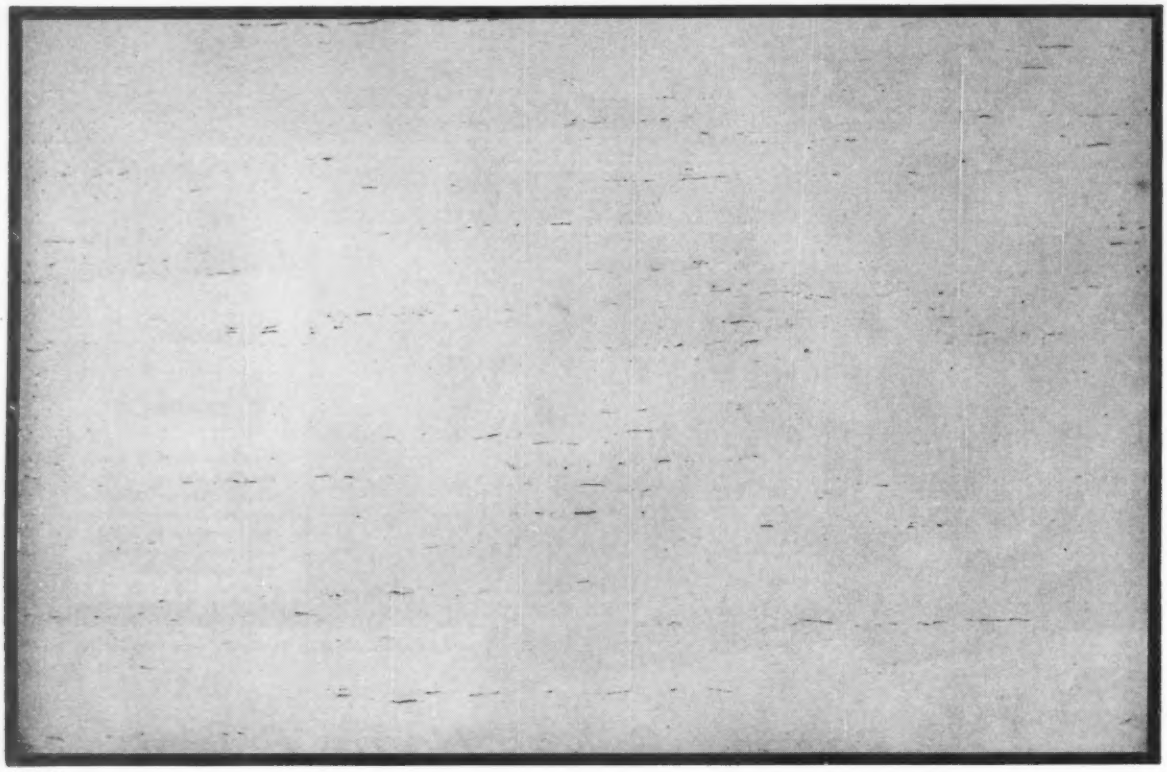
Replacement ball bearings available through United Motors System and its Authorized Bearing Distributors.

NEW DEPARTURE

BALL BEARINGS

proved reliability you can build around

Why this steel costs less to machine...



100 X

YOU'RE looking at a photomicrograph of Timken® steel that has been resulphurized to give better machinability. Those sulphides you see in the picture interrupt the chip flow, giving shorter chips and faster machine speeds.

And you get this better machinability without any sacrifice of surface quality or mechanical properties when you buy Timken resulphurized steels. Small amounts of carefully prepared sulphides are added to the molten steel under exact conditions of time and temperature. The result: Tubes or bars with good surface quality, good physical properties, and substantially improved machinability without the disadvantages sometimes found in free-machining steels. And when you buy Timken fine alloy steel, you're assured of uniformity from bar to bar, heat to heat, and order to order.

If you're looking for a way to reduce machining costs on parts made from seamless tubing, bar stock, or forgings, call your nearest Timken Company sales office. Timken resulphurized steels are available in most grades of alloy steel. ***When you buy Timken steel you get . . .*** *1) Quality that's uniform from heat to heat, bar to bar, order to order. 2) Service from the experts in specialty steels. 3) Over 40 years experience in solving tough steel problems.* The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.*

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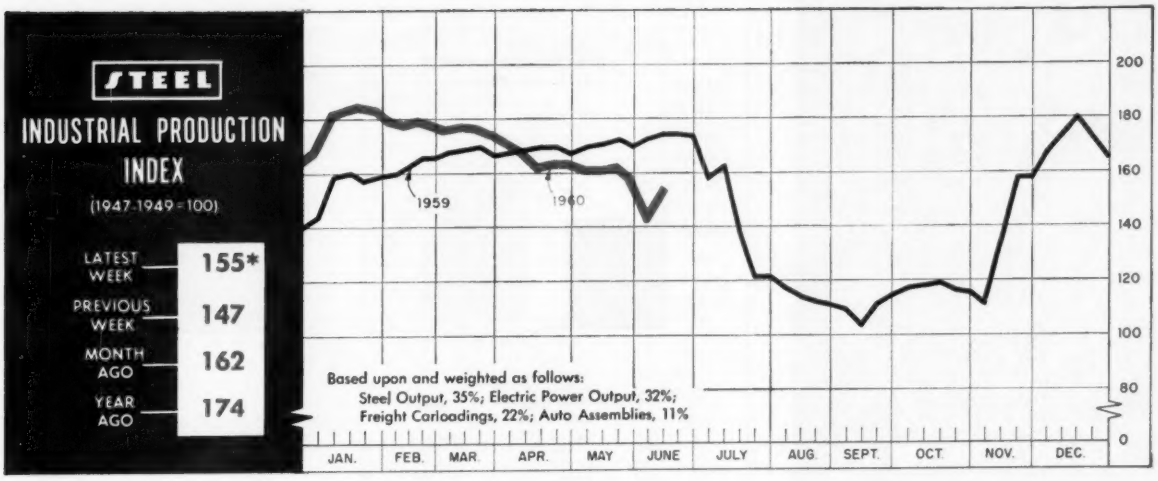

*Week ended June 11.

Capital Spending Is on Schedule

BUSINESSMEN aren't letting the lull in the economy upset them if their capital spending plans are any criterion. In the latest government survey, they say they will come within 0.4 per cent of reaching their original goal for 1960: $36.85 billion against $37.016 billion anticipated three months ago.

If the current plans are carried out, this will be the second best year on record, just missing the record ($36.962 billion) set in 1957.

• **Ups vs. Downs**—Of the six major industry groups in the table on Page 84, three have strengthened plans since the last survey was taken—mining, railroad, and communication; commercial; and other. But the gains are slightly overbalanced by a slight softening in manufacturing, transportation other than rail, and public utilities. None of the changes is great, and all represent significant advances over the 1959 figures.

Expenditures in the manufacturing group this year will be almost evenly divided between durable and nondurable industries. For the last two years, manufacturers of nondurables have accounted for the larger share. Durable goods spending for all of 1960 will be $1.7 billion more than it was in 1959, while nondurable will be up $1.1 billion. Total spending will exceed last year's figure by $4.31 billion, or 13.2 per cent.

• **Continued Strength**—As indicated in this column last week, spending for new plant and equipment will continue strong into the second half. The SEC survey reveals that the total will reach a seasonally adjusted annual rate of $37.5 billion in the third quarter compared with rates of $35.15 billion in the initial three months and $37.0 billion in the current period. The biggest gain will be made by manufacturing companies, which plan to spend at a rate of $15.1 billion next quar-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	1,775[1]	1,756	2,620
Electric Power Distributed (million kw-hr)	13,400[1]	13,134	13,503
Bituminous Coal Output (1000 tons)	8,015[1]	8,410	8,516
Crude Oil Production (daily avg—1000 bbl)	6,800[1]	6,781	7,010
Construction Volume (*ENR*—millions)	$482.0	$648.0	$524.6
Auto, Truck Output, U. S., Canada (*Ward's*)	175,725[1]	147,951	164,970
TRADE			
Freight Carloadings (1000 Cars)	640[1]	574	709
Intercity Truck Tonnage (changes from year ago)	−14.5%	−1.8%	+12.3%
Business Failures (Dun & Bradstreet)	274	299	314
Currency in Circulation (millions)[3]	$31,917	$31,811	$31,803
Dept. Store Sales (changes from year ago)[3]	−13%	+14%	+11%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$26,183	$23,890	$23,080
Federal Gross Debt (billions)	$289.3	$289.2	$286.2
Bond Volume, NYSE (millions)	$28.9	$24.4	$30.9
Stocks Sales, NYSE (thousands of shares)	17,506	14,591	15,468
Loans and Investments (billions)[4]	$102.9	$102 7	$102.3
U. S. Govt. Obligations Held (billions)[4]	$25.8	$25.8	$31.1
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	231.8	231.5	222.2
All Commodities[7]	119.7	119.7	119.4
Commodities Other than Farm & Foods[7]	128.4	128.4	127.9

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,844,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

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THE WHELAND COMPANY
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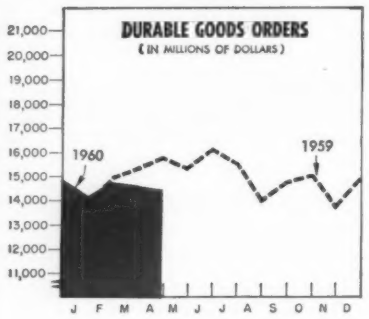
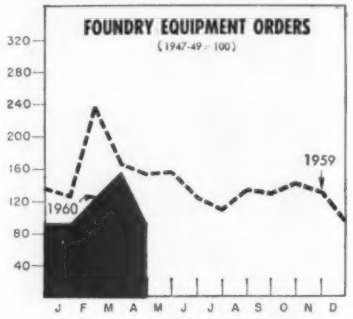
THE BUSINESS TREND





	New Orders* 1960	New Orders* 1959	Sales* 1960	Sales* 1969
Jan.	14,190	13,900	15,450	13,541
Feb.	14,800	14,918	15,670	13,870
Mar.	14,640	15,323	15,170	14,400
Apr.	14,440†	15,796	15,100†	15,166
May	.....	15,241	.....	15,515
June	.....	16,133	.....	15,771
July	.....	15,493	.....	15,384
Aug.	.....	13,974	.....	14,008
Sept.	.....	14,747	.....	14,113
Oct.	.....	15,099	.....	14,047
Nov.	.....	13,721	.....	13,479
Dec.	.....	14,770	.....	15,010

*Seasonally adjusted. †Preliminary.
U. S. Office of Business Economics.
Charts copyright, 1960, STEEL.

	1960	1959	1958
Jan.	95.5	127.4	57.9
Feb.	128.6	237.1	57.6
Mar.	159.9	166.6	85.9
Apr.	97.9	154.2	88.7
May	.....	157.0	136.1
June	.....	125.1	87.7
July	.....	110.7	77.9
Aug.	.....	134.1	74.1
Sept.	.....	131.3	64.5
Oct.	.....	140.8	118.9
Nov.	.....	131.2	83.3
Dec.	.....	95.9	137.0
Avg	.....	142.6	89.1

Foundry Equipment Mfrs. Assn.

ter. The only industry planning to curtail its rate of spending is transportation other than rail.

• **In Good Position**—Manufacturers are in a good position to fulfill those plans. Their sales in the first quarter were at an all-time high (for the period) of $85.7 billion, and after-tax profits were the third best for the quarter at $4.0 billion. Industries having record profits last quarter included motor vehicles, electrical machinery, iron and steel, and instruments.

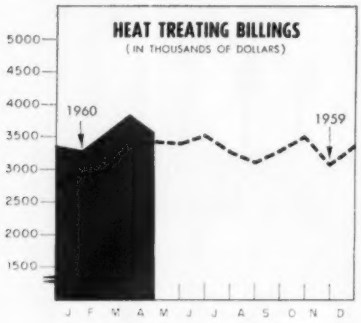
In addition, money should be

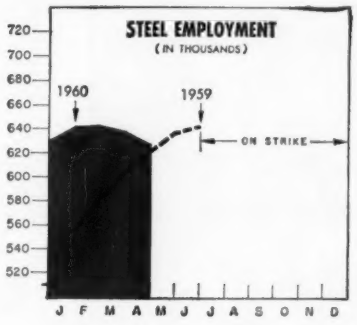
Plant & Equipment Spending on Schedule

(Billions of dollars)

	1960*	Jan.-Mar.	Apr.-June*	July-Sept.*
Manufacturing	14.90	3.09	3.79	3.73
Durable goods	7.47	1.55	1.85	1.86
Primary iron & steel	1.71	0.33	0.42	0.43
Primary nonferrous metals	0.35	0.07	0.08	0.09
Elect. mach. & equip.	0.65	0.12	0.16	0.16
Machinery, except elect.	1.17	0.25	0.28	0.28
Motor vehicles & equip.	0.85	0.17	0.20	0.24
Transport, equip., except motor vehicles	0.42	0.10	0.10	0.11
Stone, clay, & glass	0.65	0.14	0.17	0.14
Other durables	1.67	0.36	0.43	0.41
Nondurable goods industries	7.43	1.54	1.94	1.87
Mining	1.07	0.22	0.29	0.27
Railroad	1.06	0.25	0.29	0.28
Transportation other than rail	2.14	0.47	0.61	0.56
Public utilities	5.85	1.18	1.46	1.55
Communication, commercial, other	11.82	2.68	3.06	3.00
TOTALS	36.85	7.89	9.50	9.39

*Estimated.
Source: Securities & Exchange Commission.





	1960	1959	1958
Jan.	3,297.0	2,769.1	2,825.5
Feb.	3,585.8	2,828.0	2,466.3
Mar.	3,835.1	3,273.8	2,490.5
Apr.	3,552.6	3,316.1	2,538.0
May	.....	3,405.6	2,421.5
June	.....	3,518.5	2,367.3
July	.....	3,259.7	2,141.5
Aug.	.....	3,111.3	2,212.9
Sept.	.....	3,285.7	2,456.9
Oct.	.....	3,509.8	2,754.3
Nov.	.....	3,079.5	2,404.8
Dec.	.....	3,349.9	2,765.5

Metal Treating Institute.

	Employment in Thousands		Payroll in Millions	
	1960	1959	1960	1959
Jan.	641	555	$398.8	$335.2
Feb.	643	580	381.4	333.9
Mar.	637	604	398.8	385.4
Apr.	626	621	357.2	385.5
May	...	635	....	396.9
June	...	641	....	398.2
July	...	n.a.	....	n.a.
Aug.	...	n.a.	....	n.a.
Sept.	...	n.a.	....	n.a.
Oct.	...	n.a.	....	n.a.
Nov.	...	n.a.	....	n.a.
Dec.	...	548	....	400.3

n.a.=not available because of strike.
American Iron & Steel Institute.

more plentiful and less expensive the rest of 1960. The reduction of the prime interest rate from 4 to 3.5 per cent by the Federal Reserve Board was recognition that the money market has eased.

Index Bounces Back

STEEL's industrial production index regained most of the ground it lost over the Memorial Day week, indicating that there is a basic firmness in the economy despite the persistent weakness of the steel market. For the first time in many weeks, all four elements in the index were moving in an upward direction during the week ended June 11. Result: A preliminary trend line reading of 155 (1947-49=100).

Even steelmaking moved up a notch. Tonnage in the week ended June 5 was 1,726,000, followed the next week by 1,756,000. If the industry meets its scheduled output of 1,775,000 net tons for the week ended June 19, it will be the first time this year that it has put two weekly increases back to back. It doesn't mean that the outlook is rosy, but it appears that the steep decline has just about hit bottom.

The other three components of the index came close to their pre-holiday levels. Cool weather prevented the output of electricity from rebounding all the way. Inventory adjustments in the auto industry took away some of the bounce in motordom, but producers show no signs of making any serious cuts in production until the July 4 weekend. Sales in May hit a 55-month high, which should add firmness to the auto outlook. Except for the holiday week, railroad freight carloadings have been holding at about the 640,000 car level, and there is no reason to believe they will vary significantly in the near future.

Builders Strengthen Plans

The outlook for the construction industry continues to brighten. *Engineering News-Record* reports that heavy construction contracts are 9 per cent ahead of the 1959 pace. In fact, the 1960 rate is second only to that of 1956, and the gap is closing. "Soaring new plans during the last eight months point to a big second half for construction contractors. By yearend, they should have a record annual volume of new business on their books," declares *EN-R*.

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- Denso Iron Rolls
- Nickel Grain Rolls
- Special Iron Rolls
- Nioloy Rolls

OR46

THE OHIO STEEL FOUNDRY CO., LIMA, OHIO

PLANTS AT LIMA AND SPRINGFIELD, OHIO... *Virtually at the center of the steel industry*

CALVIN IRISH
Natco mgr.-prod. eng.

CLARKE M. CARLISLE
Jessop technical dir.

LEO J. KEVITT
joins Bower Roller Bearing

WERNER I. SENGER
Gisholt v. p.-eng.

Calvin Irish was made manager of product engineering, **National Automatic Tool Co. Inc.**, Richmond, Ind. He was assistant chief engineer, Machinery Div., Ex-Cell-O Corp.

Clarke M. Carlisle was named technical director of **Jessop Steel Co.**, Washington, Pa. He is in over-all charge of metallurgy, chemistry, and research and development for Jessop and subsidiaries. He was director of chemistry.

W. C. Neumann resigned as general sales manager of Union Steel Products Co., Albion, Mich., to join **Midwest Metallic Products Inc.**, Cleveland, as general manager.

James E. Tobin was made manager of sales promotion for **American Brass Co.**, Waterbury, Conn., subsidiary of Anaconda Co.

Robert E. Christian was named general superintendent; **David I. Odelius** superintendent-normalizing at the Bagdad operation of the West Leechburg, Pa., Works of **Allegheny Ludlum Steel Corp.** The Bagdad facility, under construction, will process high grade, grain oriented, silicon electric, strip steel.

Ralph L. Dabe was made sales manager, **Wayne Foundry & Stamping Co.**, Detroit. He was with Murray Corp. of America.

John D. Hoskinson was made plant engineer, **Armour Alliance Industries**, Alliance, Ohio. He was plant engineer for Hewitt-Robins Inc., Franklin, N. J.

Leo J. Kevitt was named general manager, **Bower Roller Bearing Div.**, Federal-Mogul-Bower Bearings Inc., Detroit. He succeeds **F. E. Halderman**, retired. Mr. Kevitt was director of manufacturing and engineering at Stewart Warner Corp.'s Instrument & Alemite Divisions.

Stevens A. Bennett was elected chairman, **Bennett Industries Inc.**, Peotone, Ill. **Anthony J. Gasbarra**, former executive vice president, was elected president.

John D. Heasley was made manager of **Westinghouse Electric Corp.'s** Industrial Electronics Dept., Baltimore. He succeeds **Robert C. Cheek**, recently made director of business systems application at Pittsburgh.

Russell K. Annis was made engineering manager at **Aurora Pump Div.**, Aurora, Ill., New York Air Brake Co. He was chief engineer at the Kansas City, Mo., Works of Fairbanks, Morse & Co.

Kermit E. Barker was made manager of **American Metallurgical Products Co. Inc.'s** New Castle, Pa., manufacturing plant. He was with I-T-E Circuit Breaker Co.

John D. Allan was made assistant general sales manager, Rolling Mill Products Div., **Steel Co. of Canada Ltd.**, Hamilton, Ont.

Alfred J. Carletti was made manager-headquarters manufacturing of **General Electric Co.'s** Distribution Assemblies Dept., Plainville, Conn.

Werner I. Senger was promoted from vice president in charge of balancing to vice president-engineering at **Gisholt Machine Co.**, Madison, Wis. He succeeds **George M. Class**, vice president, who now devotes his efforts to increased customer relations, patent administration, and special projects as well as serving in a general advisory capacity. **Ralph J. Miller Jr.** was made Chicago district manager, and will be assisted in sales by **Olaf M. Nysather**, former Houston district sales representative.

Republic Supply Co. of California, Los Angeles, appointed **Donald E. Becker** and **Robert R. Jones** sales managers for its new Specialty Metals Div. Mr. Becker is in charge of steel sales, Mr. Jones of aluminum sales.

Paul M. Hollinger was made general sales manager, **Sutorbilt Corp.**, Compton, Calif. He was with Fuller Co., Catasauqua, Pa., for more than 20 years, concerned with pneumatics and compressor sales engineering.

Stephen Stone Jr. was named director of sales, **Bowman Steel Corp.**, Carnegie, Pa.

Robert F. Anderson was made manager of domestic sales for **M. A. Hanna Co.**, Cleveland. He is in charge of iron ore and nickel sales activity in the U. S. and Canada.

William C. Clark Jr. was made Eastern regional manager for **Alloy Rods Co.**, York, Pa. He was assistant vice president-sales and

DALE J. RICHARDS

ETHAN A. SMITH JR.

sales managers appointed by Beryllium Corp.

ROBERT J. ACKERMAN

HAROLD G. WARNER

Cadillac works manager and general manager

marketing for Pennsylvania Flexible Metallic Tubing Co.

Beryllium Corp., Reading, Pa., appointed **Dale J. Richards** manager, beryllium alloy sales, Alloy Div.; **Ethan A. Smith Jr.** manager, beryllium metal sales, a new post. **John M. Patterson** was named to the new post of manager, overseas operations. He was sales manager, Alloy Div.

Westinghouse Electric Corp., Pittsburgh, appointed **Donald J. Povejsil** director of new product services.

Mel R. Hendricks was made assistant general manager, **Zalk Steel & Supply Co.**, Minneapolis.

National Can Corp. named **H. Dale Jordan** manager of its Los Angeles plant; **Robert P. Palm** manager of its new Vancouver, Wash., plant.

George A. Clark was appointed general manager of **Snap-Tite Inc.**, Union City, Pa. He continues as treasurer.

Robert J. Ackerman was made works manager, **Cadillac Motor Car Div., General Motors Corp.**, Detroit. He succeeds **Harold G. Warner** who was promoted to general manager of the division. **James M. Roche** was made vice president in charge of General Motors' distribution staff. He was general manager, Cadillac Motor Car Div., and a GM vice president. In his new post, he succeeds **William F. Hufstader**, retired.

Andrew G. Scott was named assistant general sales manager, **Pittsburgh Steel Co.**, Pittsburgh. He was Detroit district sales manager and is replaced by **W. E. Shutt. R. W. Mullin** replaces Mr. Shutt as Cleveland district sales manager.

Michael J. Votava was made sales manager, **Emcor Ingersoll Products Div.**, Chicago, Borg-Warner Corp. He was sales supervisor at Emcor.

William A. Cant was made factory sales and purchasing manager for **Veet Industries, Detroit.** Until last year, he was sales co-ordinator of Metal Mouldings Corp.

Charles W. Ganzel, effective July 1, was made manager of pipe and tube sales at **Bethlehem Steel Co.**, Bethlehem, Pa., to succeed **Edwin A. Buxton,** retiring. Mr. Ganzel was sales manager, Cleveland district, and is succeeded by **Frederic W. West Jr. William E. Hotaling** succeeds Mr. West as assistant manager, Plate Sales Div.

Carl E. Cannon was made product sales manager for electric heating at **Westinghouse Electric Corp.'s** Air Conditioning Div., Staunton, Va. He was regional sales manager for Frigidaire Div. of General Motors Corp.

Eric A. Bianchi was made general manager, **Mason-Neilan Div.**, Norwood, Mass., Worthington Corp. He was vice president-engineering and manufacturing of the division.

Everett F. Wagner was named vice president of an expanded Interna-

GEORGE A. CLARK

Snap-Tite gen. mgr.

MICHAEL J. VOTAVA

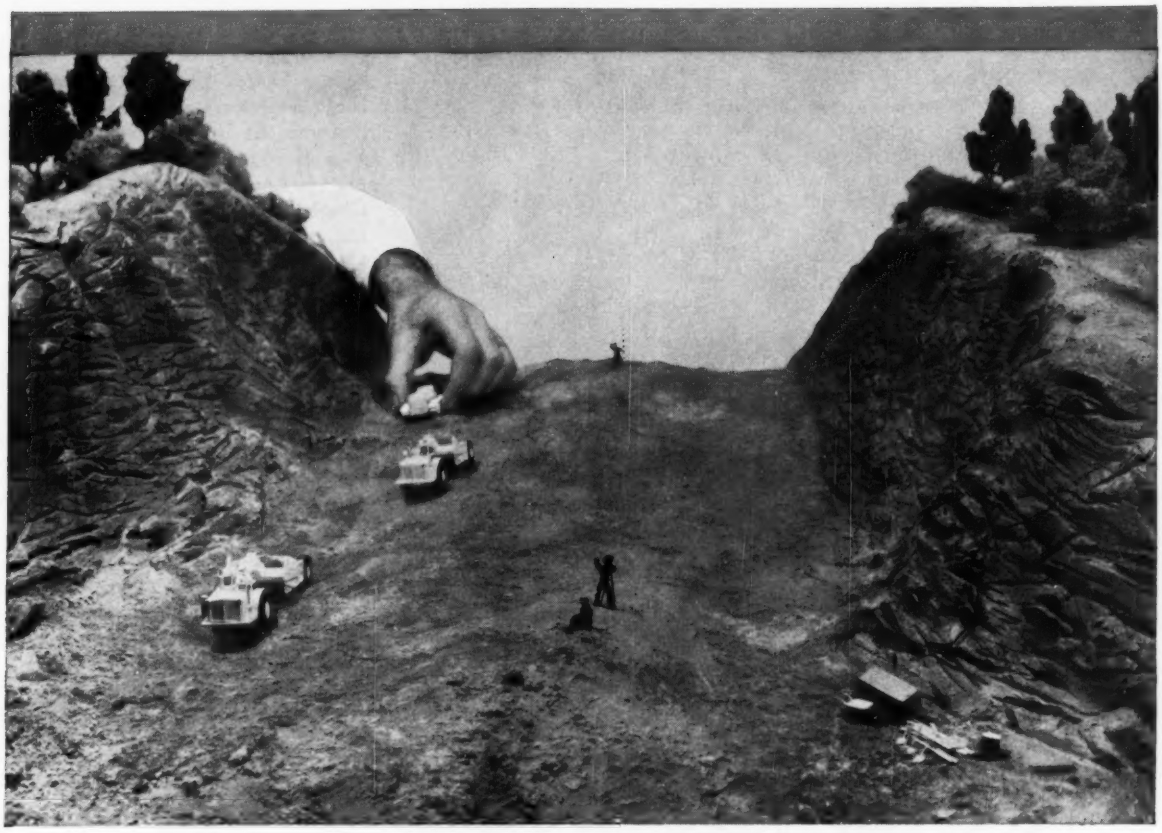
Emcor Ingersoll sales mgr.

WILLIAM A. CANT

Veet factory sales-purchasing

ERIC A. BIANCHI

Mason-Neilan gen. mgr.



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CANADA: Railway & Power Engr. Corp., Ltd. EXPORT: Copperweld Steel International Company, 225 Broadway, New York 7, New York

E. W. ALLISON
Detrex Chemical v. p.

F. T. ELLIS JR.
Krueger sales v. p.

MELVIN L. HENRY
Olin Mathieson post

JOSEPH W. COLLIER
Latrobe chief indus. eng.

CHARLES T. HEPPENSTALL
Heppenstall sales post

LEO TOBACMAN
joins Randolph Mfg.

tional Div. of **Bell & Howell Co.**, Chicago.

Joseph W. Collier was named chief industrial engineer, **Latrobe Steel Co.**, Latrobe, Pa. He was with Pittsburgh Plate Glass Co. at its Crystal City, Mo., plant.

Charles T. Heppenstall was made manager of specialty product sales for **Heppenstall Co.**, Pittsburgh. He was manager of materials and production at the New Brighton, Pa., plant.

X-ray Dept., Industrial Section, **General Electric Co.**, Milwaukee, appointed **H. W. Pickett** manager, instrument and sensor system sales; **S. T. Workman** manager, radiation generators and image systems sales.

Nikoh Tube Co., Chicago, division of International Rolling Mill Products Corp., named **William Allison** manager of sales-mechanical tubing; **L. J. Lieberthal** manager of sales-conduit.

Leo Tobacman joined **Randolph Mfg. Co.**, East Cleveland, Ohio, as chief engineer of its Airborne Mechanisms Div.

Dr. Emanuel R. Piore was elected vice president-research and engineering, **International Business Machines Corp.**, New York.

William J. Killian was made Pittsburgh district sales manager, **Vanadium Corp. of America. Dr. Thomas J. McLeer** was named assistant to Vice President **George C. Floyd** in New York. Dr. McLeer was director of research and development of Cooper Corp.

Charles C. Colozzi was elected president, **United States Gasket Co.**, plastics division of Garlock Inc., Camden, N. J.

Marion F. Huff was named district sales manager, Southeast district, Municipal & Utility Div., **Rockwell Mfg. Co.** He replaces **John G. Hoyt**, recently promoted to product sales manager, Pittsburgh.

E. W. Allison was elected vice president in charge of sales and marketing, **Detrex Chemical Industries Inc.**, Detroit. Former secretary-treasurer, he is succeeded by **G. C. Van de Riet** as treasurer (continuing as controller), and by **F. J. Chmielnicki** as secretary (continuing as legal counselor).

F. T. Ellis Jr. was elected sales vice president of **H. R. Krueger & Co.**, Detroit (formerly Krueger-Barnes Corp.) **C. E. Dray** was made sales and service representative in Illinois, Iowa, and Wisconsin.

Melvin L. Henry was appointed production manager, brass strip operations, at the Western Brass plant of **Olin Mathieson Chemical Corp.'s** Metals Div. in East Alton, Ill. He was production manager at the New Haven, Conn., brass plant. He succeeds **George N. Stuart**, resigned.

Lewis M. Duckor was made vice president-engineering, **Colvin Laboratories Inc.**, East Orange, N. J. He previously was with Lockheed Aircraft Corp.'s Missiles & Space Div. as senior research engineer in instrumentation.

General Electric Co.'s Computer Dept., Phoenix, Ariz., named **Lacy W. Goostree Jr.** department manager of marketing to succeed **George A. Hagerty**, named to the new post of manager, process computers.

James A. Holloway was made assistant general sales manager; **John C. Mallory** manager of tin plate sales, **Wheeling Steel Corp.**, Wheeling, W. Va.

Arthur L. Irish Jr. was appointed manager of stainless steel sales, **Caine Steel Co.**, Chicago.

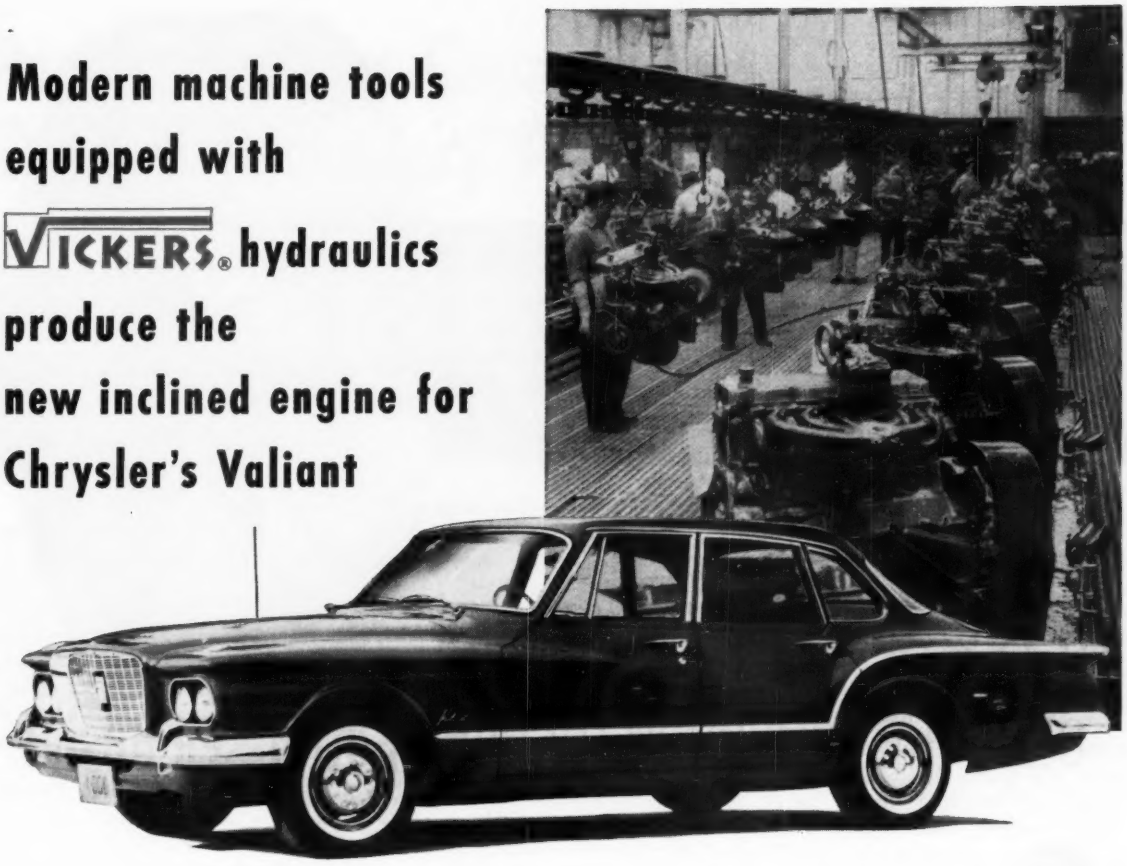
OBITUARIES...

Reese R. Saunders, 61, superintendent-hot strip mills, **Empire-Reeves Steel Corp.**, Mansfield, Ohio, died June 4.

Curt L. Oheim, vice president-product planning, **Deere & Co.**, Moline, Ill., died May 29.

Laurence H. Norton, treasurer, **Oglebay Norton Co.**, Cleveland, and affiliated firms, died June 11.

Modern machine tools equipped with VICKERS® hydraulics produce the new inclined engine for Chrysler's Valiant



Machine tools of the most modern design are required to produce the new inclined six-cylinder engine for Chrysler's Valiant in volume and to the required precision standards. A walk through the Trenton, Michigan, engine plant quickly establishes the fact that the majority of hydraulically operated machine tools are equipped with Vickers hydraulics. (See tabulation at right.)

Machine builders and users have long been aware that performance goes up and maintenance decreases when Vickers hydraulics are specified. *One* reason is that each Vickers pump, motor, and control element represents advanced hydraulic design and manufacture. *Second*, unmatched application engineering experience is applied to planning the installation. *Finally*, service wherever necessary is promptly provided by technicians who are Vickers hydraulic specialists. More details are available about specific products and services in the *all new* Catalog 5001.

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DIVISION OF SPERRY RAND CORPORATION
Machinery Hydraulics Division
DETROIT 32, MICHIGAN

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Apex Corporation
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Buhr Machine Tool Co.
Contri-Spray Corp.
Cleveland Hobbing Machine
Colonial Broach & Mach. Co.
The Cross Company
Ex-Cell-O Corp.
Fitchburg Engineering Corp.
The Foote-Burt Co.
Gisholt Machine Co.
Greenlee Bros. & Co.
Heald Machine Co.
Industrial Metal Products Corp.
The Ingersoll Milling Mach. Co.
F. Jos. Lamb Co.
Landis Tool Co.
The LaPointe Machine Tool Co.
LaSalle Machine Tool, Inc.
The R. K. LeBlond Mach. Tool Co.
Leland Detroit Mfg. Co.
Michigan Special Machine Co.
Micromatic Hone Corp.
The Motch & Merryweather Machine Co.
National Acme Co.
National Automatic Tool Co., Inc.
Norton Company
Sheffield Corp.
Snyder Corp.
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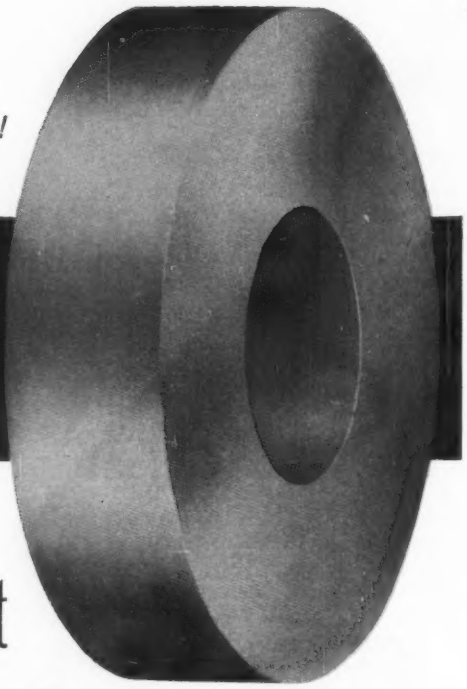
This disc ground roller needs no lapping!



This 1⅛" dia. x ½" steel roller was production ground to lapped tolerances in a BESLY DH4 grinder at a rate of 240 per hour. Size was held to ±.0001", flatness and parallelism to .000075", finish to better than 4 micro-inch. Stock removed was .0004". *Normal lapping operation was eliminated!*

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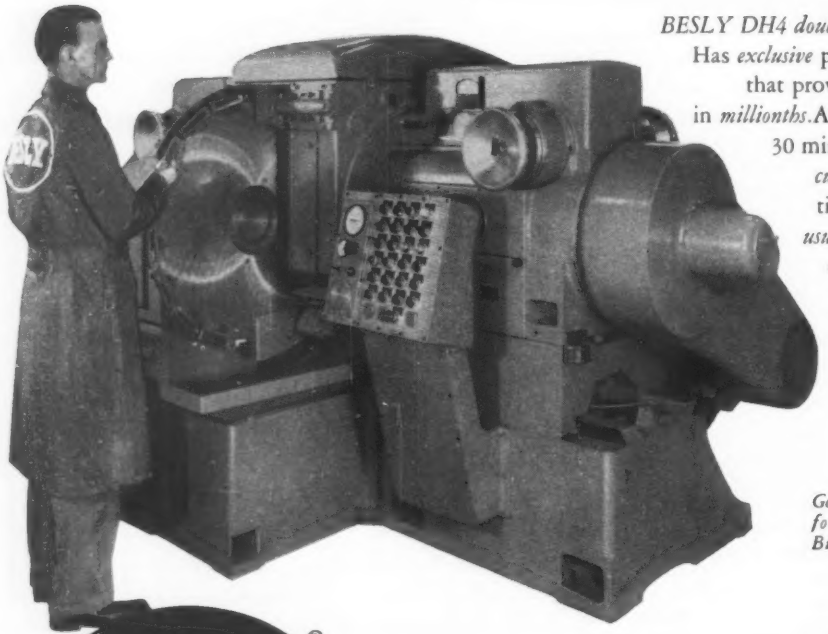

BESLY DH4 double horizontal spindle disc grinder. Has *exclusive* precision quill and clutch infeed that provides feed increments calibrated in *millionths.* Abrasive discs can be changed in 30 minutes without disturbing setup, *cutting downtime in half.* Dressing time is only four minutes, *⅕ the usual time!* Simplified push-button operation and controls, built-in dials, gages and meters to indicate abrasive conditions, movement and alignment; motor load, etc., assure precise results, dependable grinding production.

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Porter Enlarges Capacity Of Two Refractory Plants

H. K. PORTER COMPANY INC., Pittsburgh, has started a $4 million construction and equipment modernization program at the Bessemer, Ala., and Wellsville, Ohio, plants of its Refractories Div. Major items will include two new tunnel kilns at Wellsville and one at Bessemer. They'll be erected by Swindell-Dressler Corp., Pittsburgh.

The modernization and expansion steps are geared to meet modern steelmaking practices, says C. L. Holbert, president. They will increase the division's refractory brick production, provide new products, and improve product quality through more accurate quality control and better manufacturing techniques, he adds.

• **Bessemer Plant**—A factory building and storage facilities, a tunnel kiln, dryers, and new brickmaking facilities are planned. Cost: Almost $2 million. The facilities will increase the plant's capacity to produce ladle brick and provide facilities to turn out added lines of fire clay refractories.

• **Wellsville Plant** — About $1.5 million is being spent at the McLain Works for two tunnel kilns, additional dryers, new machinery and equipment. Expansion and modernization will beef up ladle brick production capacity.

• **New Mine**—An estimated $455,000 will be invested in a mechanized clay mine. The new mine will include a crusher elevator, conveyors, bins, and structures. It will provide a central source of high quality clay for the McLain group of Porter plants in the area.

Overseas Outlets Growing

U. S. metalworking firms continue to strengthen their sales outlets and production facilities abroad. These projects and agreements have been announced recently:

• **Metal & Thermit Corp.** is manufacturing ceramic opacifiers at a plant in Monterrey, Mexico. The plant is operated by Industrias M&T de Mexico, a subsidiary of the New York firm. Plans call for expansion to keep up with the Mexican and Latin American markets.

• **Clark Equipment International C.A.** has established a licensing agreement with Societe Mecanique et Automobile, Saint - Etienne, France. SO.M.A. will manufacture Clark's line of transmissions, axles, and axle housings for sale in European markets. Clark International is a subsidiary of Clark Equipment Co., Buchanan, Mich., manufacturer of material handling equipment, construction machinery, trucktrailers, and automotive components.

• **Head Wrightson (Australia) Pty., Ltd.**, will represent Salem-Brosius Inc., Pittsburgh, as a sales licensee and a manufacturing licensee. The agreement covers industrial heating and heat treating furnaces, material handling equipment, and the Pittsburgh firm's line of mechanical products.

• **Enthone de Mexico,** a subsidiary of American Smelting & Refining Co., Prolongacion de Pino 669, Mexico 15, D.F., has been made the exclusive Mexican licensee for processes and materials of Roto-Finish Co., Kalamazoo, Mich.

• **Acme-Efco Ltd.** has been formed by Acme Mfg. Co., Detroit, and Electro-Chemical Engineering Co. Ltd. of Sheerwater, Woking, Surrey, England. The new firm will manufacture and sell Acme polishing and buffing machines to the English market.

• **Baird-Atomic Inc.**, Cambridge, Mass., and **Hilger & Watts Inc.**, Chicago, have signed a U. S. sales and service agreement with Hilger & Watts Ltd., London, England. Under the agreement, Baird-Atomic will sell and service certain Hilger & Watts units which complement its own line. Initial emphasis will be on the English firm's vacuum spectrometers for rapid analysis for carbon and other elements in steel.

• **Union Carbide Caribe Inc.**, a subsidiary of Union Carbide Corp., New York, will construct a polyethylene plant near Ponce, Puerto Rico. Initial anual capacity: 110 million lb.

Copperweld Steel Builds

Copperweld Steel Co., Pittsburgh, will start construction next month on an office building for its Wire & Cable Div. at Glassport, Pa. The three story building will cost about $250,000, says F. E. Leib, vice president in charge of the division. It will contain about 15,000 sq ft of space and will house the division's headquarters staff.

Popham Buys Gorham Tool

George N. Popham and associates acquired Gorham Tool Co., Detroit, manufacturer of high speed steel and carbide cutting tools. Plans for expanding facilities are being programed to provide capacity for several new product lines which will be introduced soon. Officers are: G. N. Popham, president and treasurer; J. J. Iglodan, executive vice president and secretary; and J. L. Prisk, vice president-manufacturing.

Buys Welding Business

Chicago Bridge & Iron Co., Chicago, purchased the field automatic overlay welding operations of the Portland Co., Portland, Maine. The process is used to provide corrosion and erosion resistant linings for the interiors of steel tanks and towers designed for high pressure.

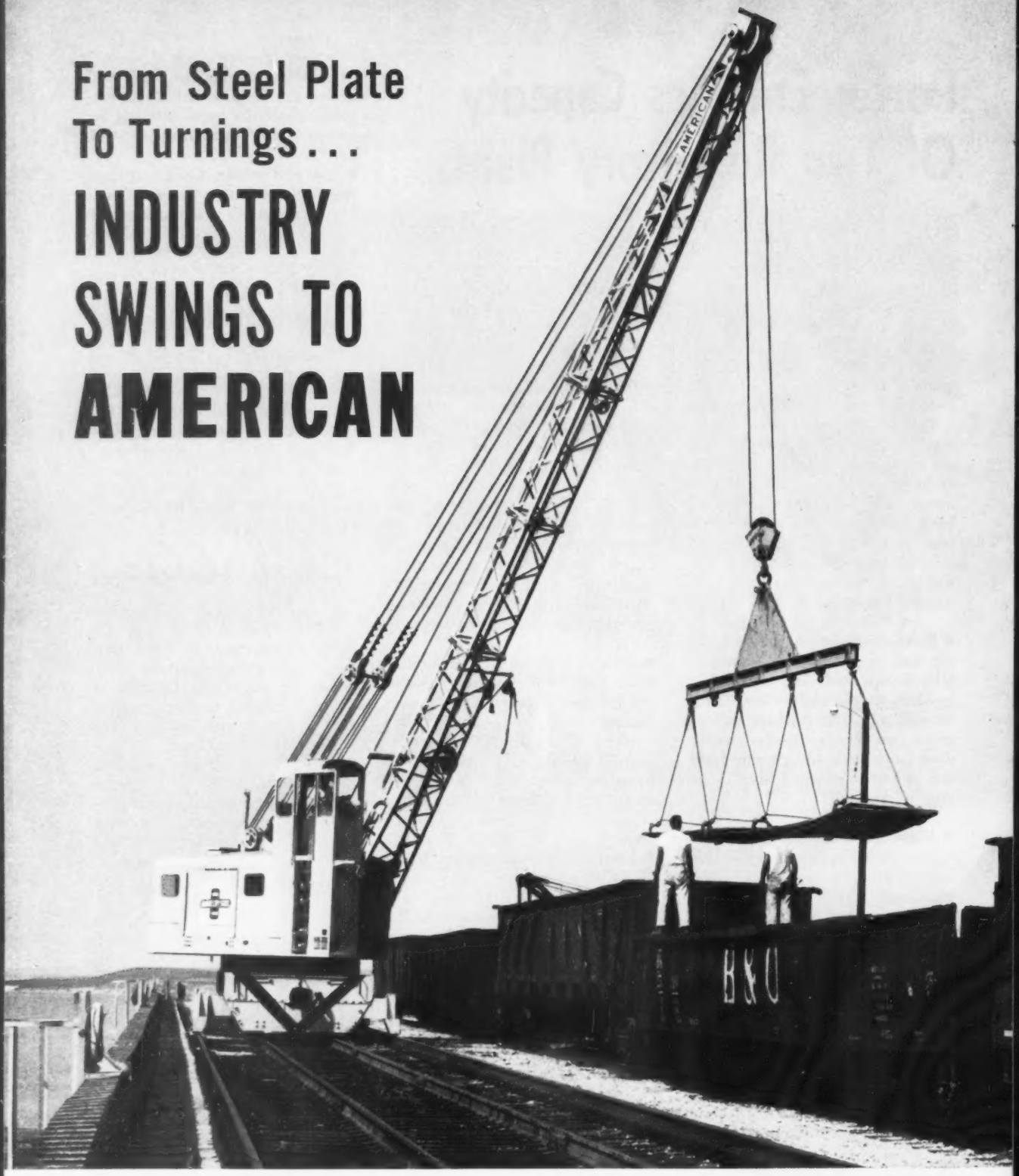
Improves Forging Service

Wyman-Gordon Co., Worcester, Mass., is moving its Prex, Franklin Park, Ill., facilities and production to its Eastern Div. plants in Worcester. The move is designed to accelerate expansion of the division's forging program in missiles, rockets, and aircraft. The Prex transfer coincides with an increase in work with beryllium. Facilities for ma-

(*Please turn to Page* 96)

From Steel Plate To Turnings...

INDUSTRY SWINGS TO AMERICAN



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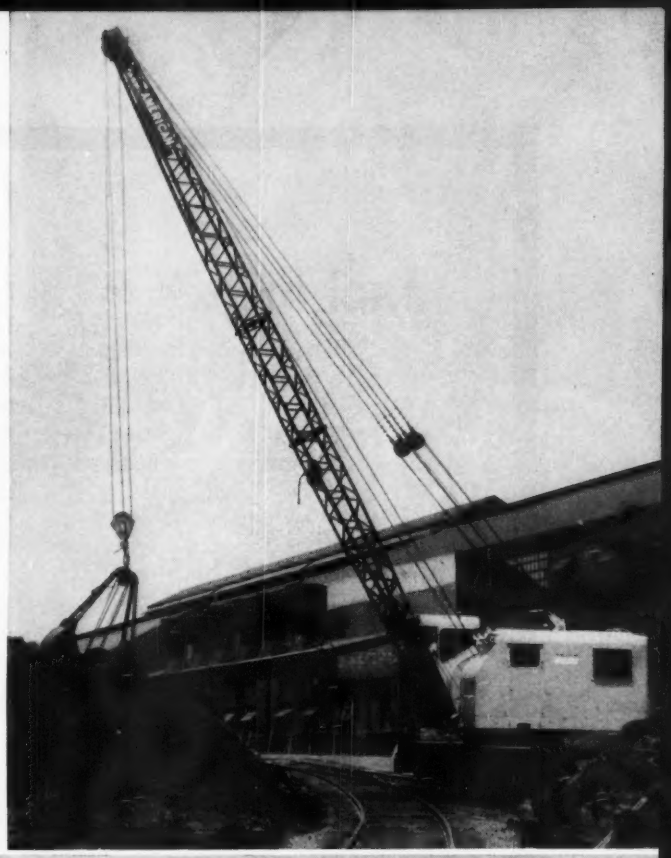
American Locomotive cranes, both Diesel and DiesELectric,® are better engineered, better equipped to move materials faster, more efficiently, with greater dependability. Built for 24-hour, day after day performance, Americans give you trouble-free service on every job.



machine all these small parts from

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Pulleys
Pump Parts
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Rings
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Seals
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Sleeves
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Sprockets
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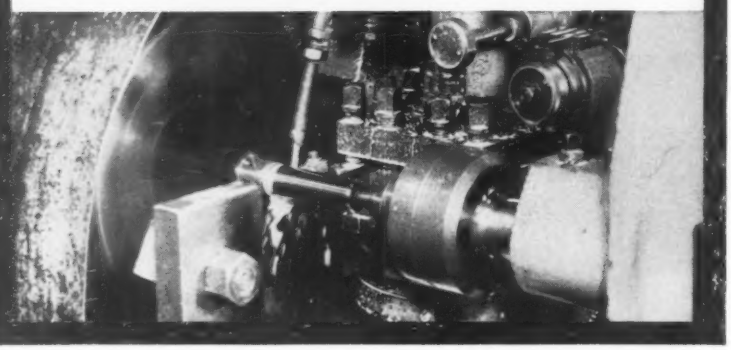

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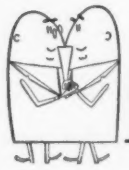
(*Concluded from Page* 93)

chining, processing, and inspection of the metal will be increased threefold.



CONSOLIDATIONS

Textron Electronics Inc., New York, acquired **Electronic Research Co.**, Kansas City, Mo., producer of frequency control crystals and crystal ovens, and **Allegany Instrument Co.**, Cumberland, Md., producer of electronic measuring devices.

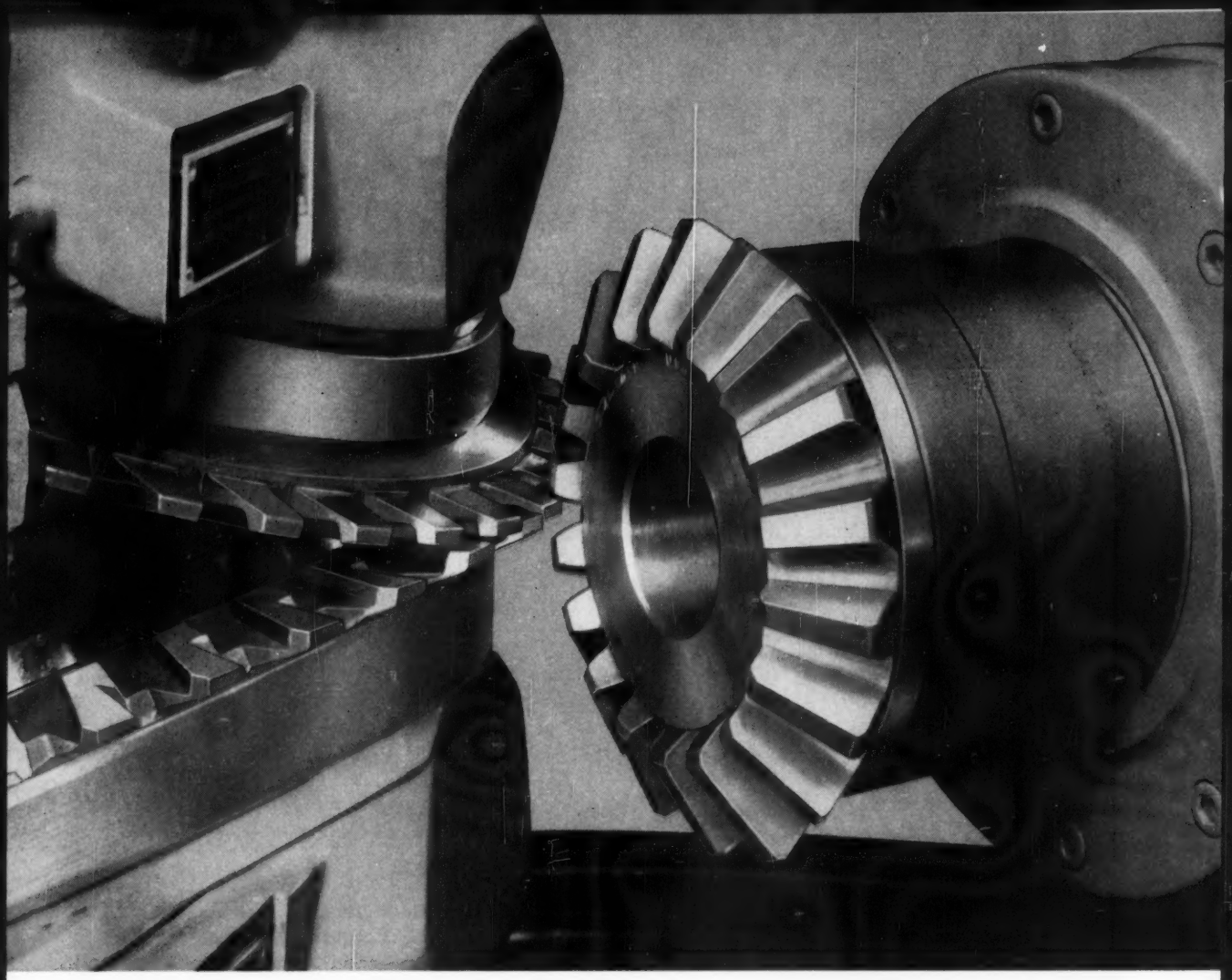
American Machine & Foundry Co., New York, will purchase the **Cuno Engineering Corp.**, Meriden, Conn., subject to approval of Cuno stockholders. The Cuno firm produces filters.

H. K. Porter Company Inc., Pittsburgh, purchased **Allied Paint Mfg. Co.**, Tulsa, Okla., and will operate the property as the Tulsa Works of its Paint Div.

National Malleable & Steel Castings Co., Cleveland, acquired **Hill, Hubbell & Co.**, that city, a division of General Pacific Corp., Culver City, Calif. The company applies protective coatings to pipe.

W. E. Clark & Co. Inc., Everett, Mass., is negotiating for the purchase of the **Herrick Co.**, Boston. Clark specializes in hot rolled carbon steel products (bars, sheets, strip, and flame cut plates); Herrick makes sheet metal products.

General Mills Inc., Milwaukee, acquired **Daven Co.**, Livingston, N. J., and **Laible Mfg. Co.**, Manchester, N. H. Daven produces components for the electronics industry; Laible, precision wire wound resistors and other subassemblies for the Daven firm. Laible will be operated as a division of Daven which becomes a subsidiary of General Mills. Officers of the subsidiary are: President, R. A. Wilson; vice president and assistant to the president, Lewis Newman; vice president-marketing, E. L. Grayson; vice president-engineering, F. A. Schaner; vice president and plant manager at the Livingston, N. J., location, A. M. Steinbach; vice president and plant manager at Man-



How to complete gears up to 16″ O.D. in one cut from the solid

The Gleason No. 114 Straight Bevel Coniflex® Generator cuts gears directly from the solid in diameters up to 16″, up to 2½″ face width and 2½ diametral pitch.

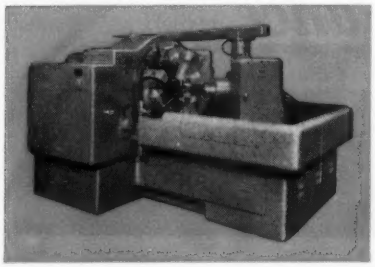
With it you obtain much faster production rates—up to five times faster than with other methods. Still it retains a basic flexibility which permits quick changeovers from one job to another.

Excellent quality. Even with the speed of the No. 114 Coniflex Generator, quality remains excellent. It provides a smooth blend of root, fillet, and tooth flank—your assurance of strong, accurate teeth.

Coniflex gears give localized tooth bearing, too, assuring practical assembly tolerances.

Simplified calculations. You can do all calculations with a slide rule. You can also control tooth bearing easily to suit various operating conditions or to set up interchangeability with existing gears.

For more details on the No. 114, write for bulletin.



77

GLEASON WORKS

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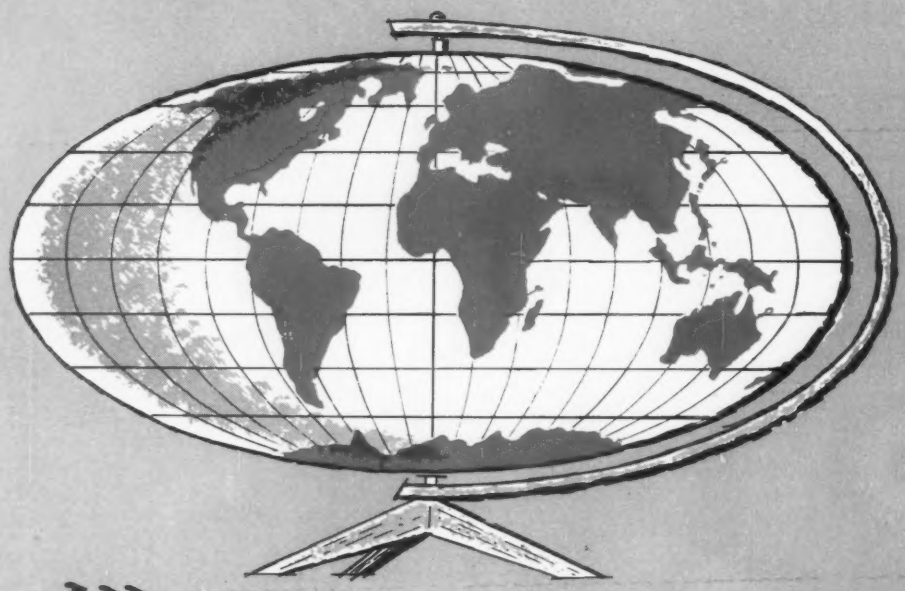
Throughout the World....



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The name Alliance is a trademark wherever you go!

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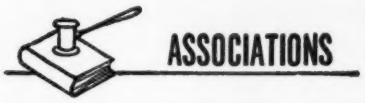
chester, N. H., B. J. Perry; secretary and general counsel, D. S. Leeper; treasurer and assistant secretary, R. D. Mueller. K. J. Carlson has been named acting general manager of the Daven Co.

Merger of **Canada Wire & Cable Co.**, Toronto, Ont., with **Western Wire & Cable Co.**, Edmonton, Sask., is being negotiated. Western has plants also in Weyburn, Sask., and Lancaster, N.B.; Canada Wire, in British Columbia, Alberta, Manitoba, and Quebec.



ASSOCIATIONS

American Supply & Machinery Manufacturers' Association Inc., Cleveland, elected these officers: President, S. D. Conant, Jacobs Mfg. Co., West Hartford, Conn.; first vice president, P. A. Johnson, Dake Corp., Grand Haven, Mich.; second vice president, G. H. Woodland, Chain Belt Co., Milwaukee; secretary, Lewis Barnard Jr., Lufkin Rule Co., Saginaw, Mich.; and treasurer, W. H. North, Ferry Cap & Set Screw Co., Cleveland.

National Industrial Distributors' Association, Philadelphia, elected these officers: President, M. I. Stray, Charles A. Templeton Inc., Waterbury, Conn.; first vice president, J. D. Williams, Mau-Sherwood Supply Co., Cleveland; second vice president, W. L. Foss, M. L. Foss Inc., Denver; and executive secretary, R. C. Fernley.

John C. Pye, Pye-Barker Supply Co. and Pye-Barker Welding Supply Co., Atlanta, was elected president of the **Southern Industrial Distributors' Association**, that city.

National Association of Purchasing Agents, New York, elected Paisley Boney, J. P. Stevens & Co. Inc., Greensboro, N. C., president. The financial member of the executive committee is Herbert Layport, Wyman-Gordon Co., Worcester, Mass. Other members of the executive committee are: C. E. Temple, Allis-Chalmers Mfg. Co., Gadsden, Ala.; T. O. English, Aluminum Co. of America, Pittsburgh; K. A. Schmitz, E. J. Bartells Co., Portland, Oreg.;

(*Please turn to Page* 102)

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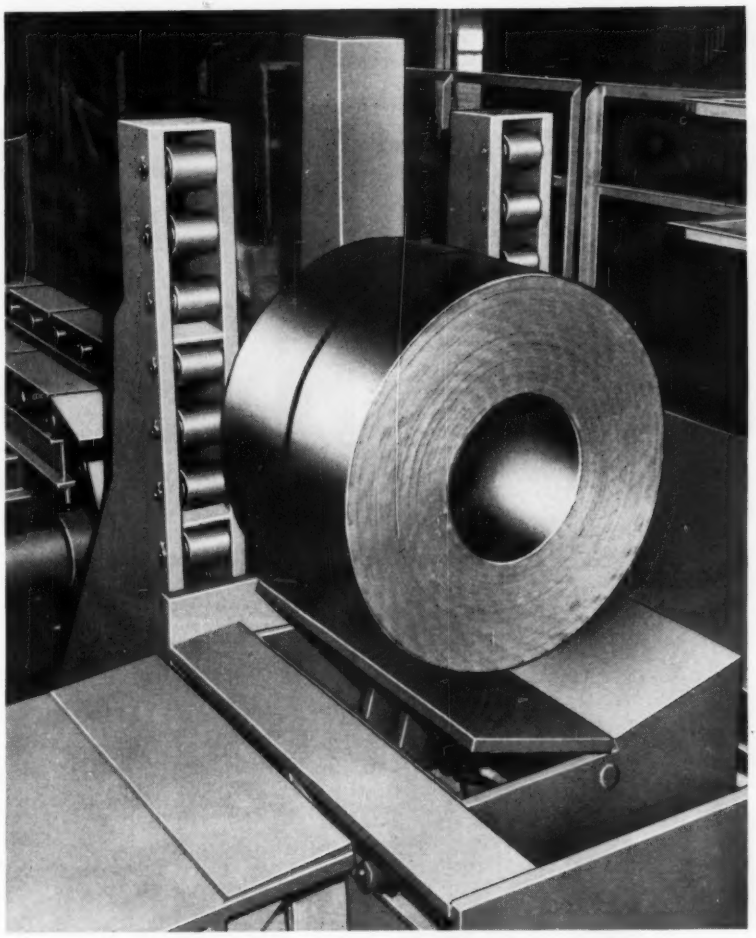

• With 3 large modern plants, competent people in engineering and manufacturing, and 55 years of experience in mechanized handling, Mathews makes available to American and Canadian manufacturers a conveyer service complete in every detail, from proposal engineering through installation.

That is why we can confidently say, when you buy Mathews Conveyers you're sure to get outstanding performance.

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Over fifty Years of Leadership in Mechanized Handling

MATHEWS

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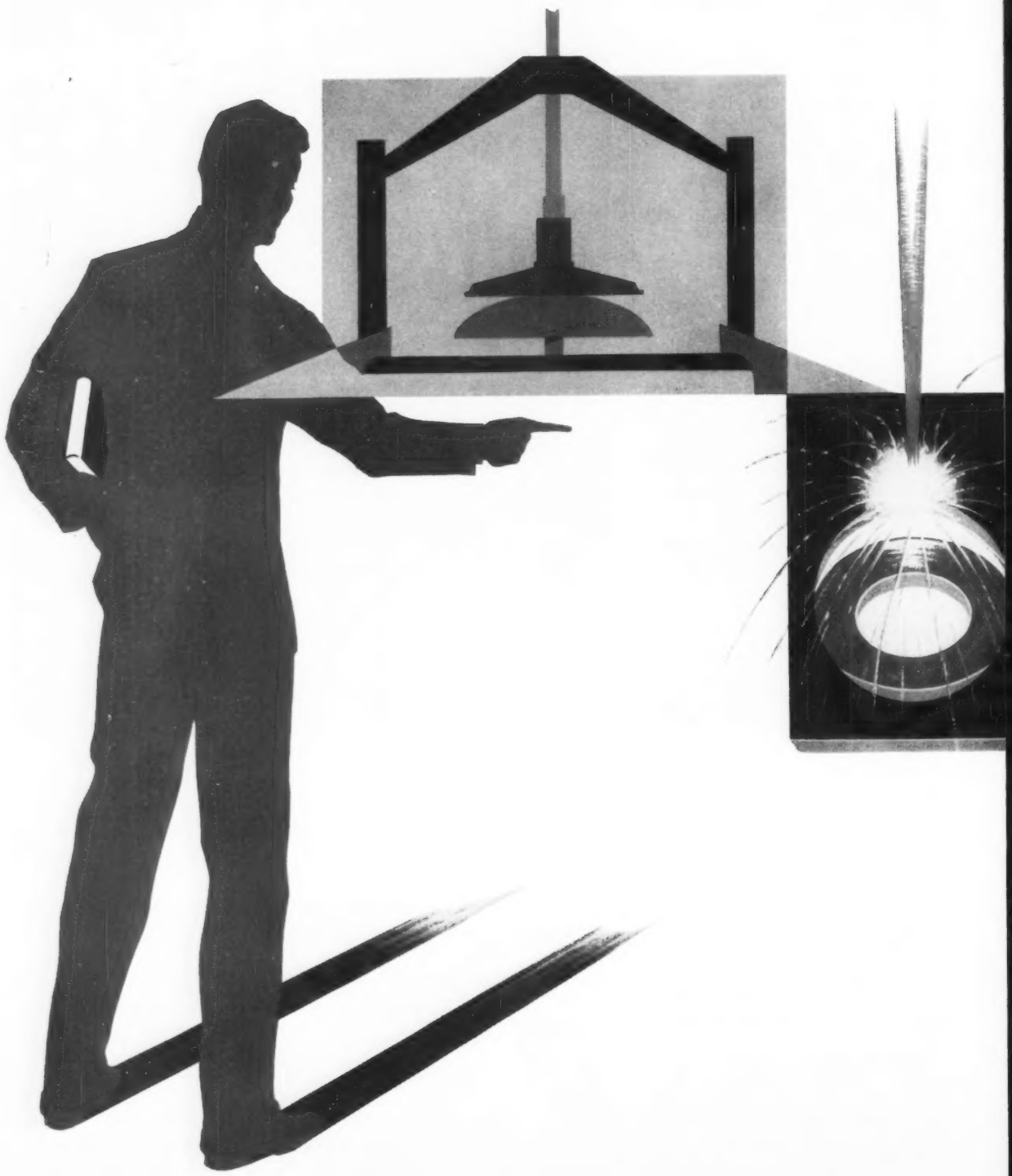
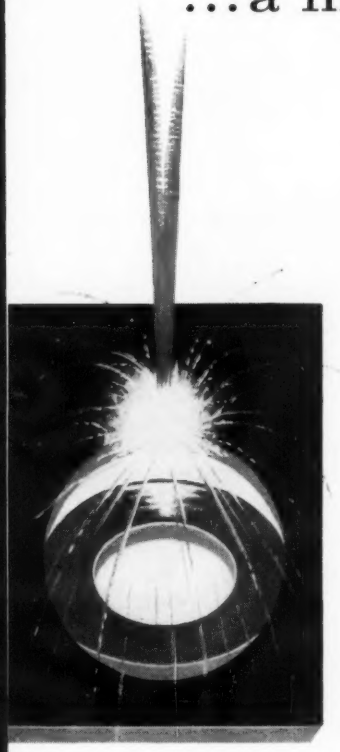


CLAYMONT?

CF&I-Claymont is a man with a textbook ...a man controlling a whirling head ...a man with fingers of flame



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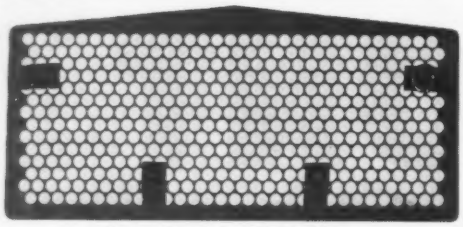
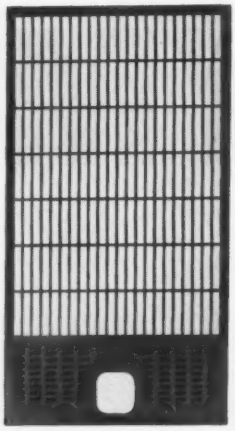


Rodent Guard for Electric Motor



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Our new 32-page catalog illustrates a great variety of perforated metal patterns and gives complete working data. Also shows many modern applications. Write for Catalog 59. No charge or obligation.

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Manufacturers of DIAMOND Perforated Metal Panels for Modern Acoustical Ceilings.

SINCE 1903

PUNCHES • DIES • RIVET SETS
COMPRESSION RIVETER DIES

(*Concluded from Page 99*)

Clinton Bishop, Alan Wood Steel Co., Conshohocken, Pa.; H. J. Jungbluth, R T & E Corp., Waukesha, Wis.; A. B. Wadsworth, Allegheny Ludlum Steel Corp., Pittsburgh; G. L. R. Baumhardt, Redmond Co. Inc., subsidiary of Controls Co. of America, Owosso, Mich.; W. C. Adamek, American Electric Co., Wichita, Kans.; F. C. Esser, Lamp Div., Westinghouse Electric Corp., Bloomfield, N. J.

Association of Industrial Advertisers, New York, elected these officers: Chairman, Jay M. Sharp, Aluminum Co. of America, Pittsburgh; vice chairman, T. A. Yellowlees, Canadian General Electric Co., Peterborough, Ont.; secretary-treasurer, J. C. Lucas, Hazard Advertising Co., New York. Vice presidents include: C. A. Bryant, Baroid Div., National Lead Co., Houston; Dar Johnson Jr., Electric Steel Foundry Co., Portland, Oreg.; and W. B. Daub, Sun Oil Co., Philadelphia.

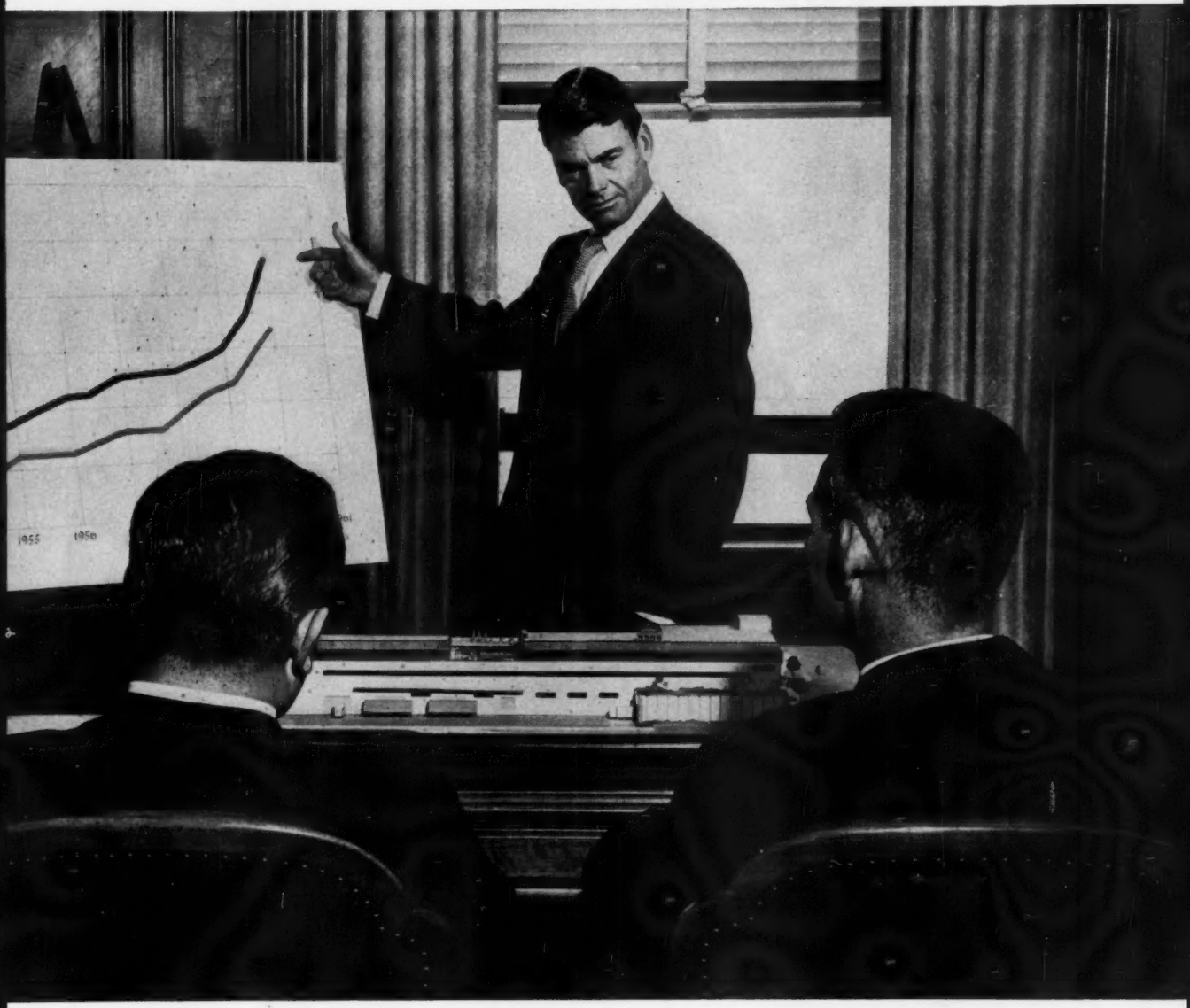
Kenneth H. Koopman has been appointed director of the **Welding Research Council of the Engineering Foundation,** New York. Charles F. Larson Jr. has been named secretary.

Electronic Industries Association, Washington, elected these officers: President, L. Berkley Davis, General Electric Co., Schenectady, N. Y.; executive vice president, J. D. Secrest; general counsel, J. B. Olverson; senior vice president, R. S. Bell, Packard Bell Electronics Corp., Los Angeles; and treasurer, L. F. Muter, Muter Co., Chicago. Vice presidents are: W. S. Parsons, Globe-Union Inc., Milwaukee; Ben Adler, Adler Electronics Inc., New Rochelle, N. Y.; S. R. Curtis of the Military Products Div.; and A. L. Chapman of the Tube & Semiconductor Div.

H. E. Lore, Dravo Corp., Pittsburgh, has been elected vice president of the **National Constructors Association,** Washington.

J. Y. McClure, Convair Div., General Dynamics Corp., Ft. Worth, Tex., was elected president of the **American Society for Quality Control,** Milwaukee.

Pre-Engineering by **KAISER ENGINEERS** answers basic plant expansion questions...



Profitability? Faced with the decision to expand your plant facilities, you should first determine whether all elements combine to form a pattern of future profitability. Independent analysis of all aspects of your proposed program is the *Pre-Engineering* service offered by Kaiser Engineers. The studies and evaluations furnished by KE Pre-Engineering represent only one phase of total KE services. Kaiser Engineers designs and builds for the Steel industry...offers skilled experience in all types of facilities from raw material plants to finishing mills. From Pre-Engineering through design and construction, Kaiser Engineers provides complete one-company service and ingenuity based on years of experience.

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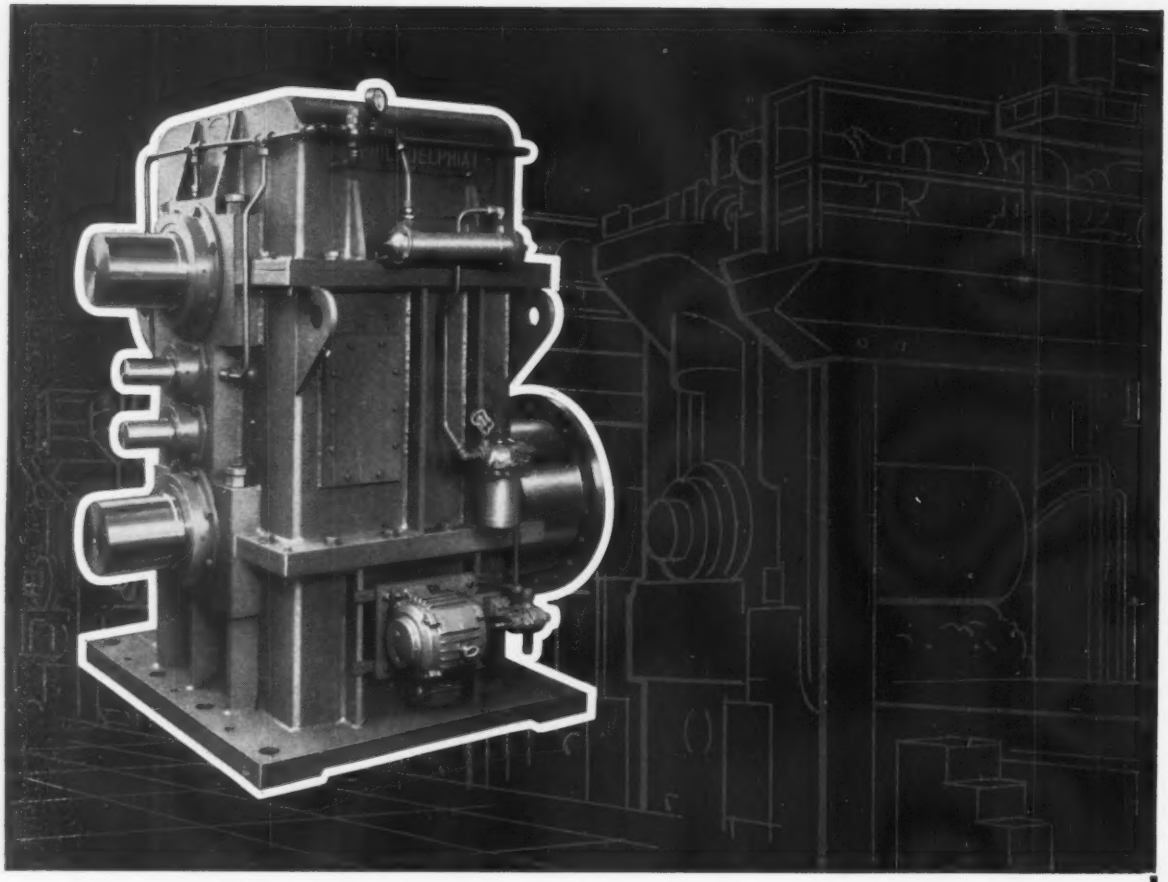

This rolling mill pinion stand is a typical example of how Philadelphia Precision Ground Gearing is revolutionizing large mill drives.

Radically improved gear accuracies reduce dynamic load factors . . . gearing has increased load carrying capacity. Result: you can save space, increase speeds, transmit more power and get longer life. And in most instances, Philadelphia can furnish precision ground gear drives at no greater cost than conventional and special drives now being used.

Philadelphia Precision Ground Gearing for heavy duty applications is the most important advance in power transmission in the last decade. It is a major breakthrough in gear manufacturing technology. So advanced in fact, that conventional standards have become out of date overnight. Now you can solve drive problems you could never solve before . . . because you have advantages that were never available before.

For complete information, write today for our catalog on Precision Ground Gearing.

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SUNPOWER— A solar power device for spacecraft will deliver 3000 watts of electricity for up to a year, says Tapco Group, Thompson Ramo Wooldridge Inc., Cleveland. Called Sunflower I, it is being built for Centaur or Saturn launched spaceships, weighs about 700 lb, and features a petallike collecting mirror which unfolds to a diameter of 32 ft.

NEW PIEZOELECTRIC— Bell Telephone Laboratory, Murray Hill, N. J., says zinc oxide and cadmium sulfide doped with lithium are good piezoelectric compounds (n-type semiconductors). Zinc oxide's piezoelectric characteristics are said to be four times greater than those of quartz.

AUTOMATED FRICTION WELDER— Czech technicians have succeeded in making a prototype welder based on the friction principle, European sources report. Claims: The method welds dissimilar metals; power consumption is 20 times under that of other welding processes.

EXPLOSIVES CAN BE SAFE— More than 80 per cent of the explosive forming being done can be handled as safely indoors as most work with extra large forging presses, says Allan T. Fuller Jr., manager of technical services, National Northern Div., American Potash & Chemical Corp., West Hanover, Mass. His firm does a lot of its explosive forming indoors.

TINY MOTORS—A new electric motor no larger than a cigarette filter puts out 30 ounce-inches of power and can be run at 1/6 to 300 rpm, says A. W. Haydon Co., Waterbury, Conn.

HIGH PRESSURE BENEFITS— When metals are mechanically worked or treated in an environment of more than 15,000 psi, strength and ductility increase significantly, states C. A. Swenson, experimental physicist, Ames Laboratory, Iowa State University of Science & Technology, Ames, Iowa. High pressure work up to 1.5 million psi has been done on nickel, tantalum, molybdenum, and similar metals. He believes the extraordinary tensile strengths of hard drawn wire are probably due to high pressures in the die drawing process.

40 ARCS FROM ONE SOURCE— Single welding power sources which will handle many operators may be growing in popularity. One company (A. O. Smith, Milwaukee) says it recently delivered its largest order ever to the Navy.

FASTER TRANSLATIONS—Typists who reproduce Russian text at 40 words a minute have been holding up IBM's electronic language translator in Washington. A new device which scans the original Russian text recognizes 1000 characters per second.

PLANEMAKERS DIVERSIFY—Several aircraft builders have been moving toward diversification to stabilize. Grumman Aircraft Engineering Corp., Bethpage, N. Y., says its wholly owned subsidiary, Aerobilt Bodies Inc., has designed a new kind of steel-aluminum trucktrailer with adjustable rear wheels which can be moved fore and aft to obtain the best distribution of a pay load.

AIDS HOT FORMING— Cast beryllium dies make possible the forming of advanced metals at 1300° F, reports Republic Aviation Corp., Farmingdale, N. Y. By employing the technique, a 1 ton press can do as much work as one rated at 750 tons.

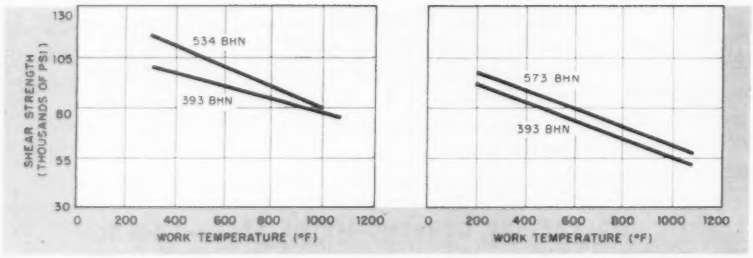
BETTER CERAMIC-METAL SEAL—A new iron-nickel-cobalt alloy developed by General Electric Co., Schenectady, N. Y., permits alumina-to-metal joints in tubes, converters, and other high temperature devices. It is said to have a lower coefficient of expansion than former metals and alloys employed.

This type hot machining can boost tool life 100 times in some cases by making the workpiece easier to cut. An induction coil (at left of cutter) heats a localized area of the work just before the cutting tool hits it. Temperatures are measured by a tool-work thermocouple and observed on an oscilloscope

FIRST REPORT

Hot Machining Cuts Producibility Barrier

Why It Works



Two charts show why hot machining works. On both AISI 4340 (left) and Thermold J, shear strength drops as the temperature goes up, making it easier to take off a chip. In both cases, a 370 carbide tool was used. Results on the other two tested materials are similar

• LOCALIZED heating of the workpiece to as high as 900° F boosted tool life up to five times when turning Uniloy 17-4 Mo (400 Brinell) and 20 times when cutting AISI 4340 (600 Brinell).

• In face milling, tool life at 1000° F is 20 times better than at room temperature on Uniloy 17-4 Mo, and it's 100 times better when machining Thermold J, a hot work die steel.

• No detectable change in microstructure was apparent on examination of hot machined specimens, but microhardness checks showed tempering occurs when the tempering temperatures are exceeded.

Those are three of the conclusions from a three year research program at Cincinnati Milling Machine Co., Cincinnati. The last part of the program was sponsored by the Manufacturing Methods Division, Air Materiel Command. Col. Preston L. Hill is chief, Manufacturing Methods Division; R. T. Krueck is project engineer. Results look so promising that the AMC has sponsored an additional one year program for refinement of the technique.

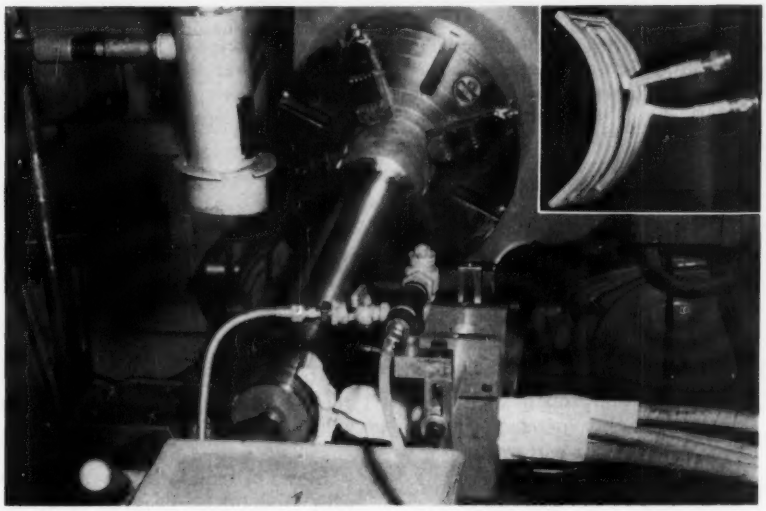
Cincinnati engineers now feel that hot machining has a "high potential" in processing some metals that pose problems under conventional machining conditions.

• Materials selected were determined in a survey of 28 aircraft companies.

Part of the survey was aimed at finding the types of hard-to-ma-

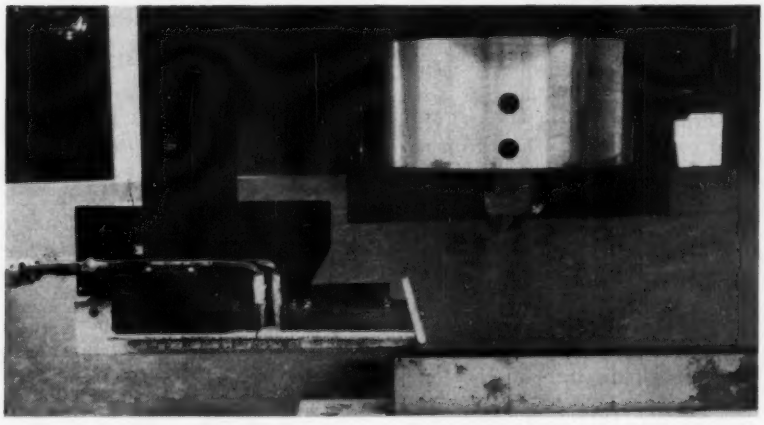
TURNING

Hot turning was done on this 21½ in. Cincinnati Traytop lathe. A curved induction coil (1.2 megacycles) scans the back of the cylinder, riding just ahead of the cutting tool. A close-up of the coil is shown in the inset



FACE MILLING

This is the setup used for face milling. Heat is supplied by the 1.2 megacycle coil that rides above the work. A thermocouple can be seen projecting from the back of the cutter. Heat is controlled by the gap, the input power to the coil, and the feed rate



chine materials the industry is using. Four representative materials were selected for the tests:

1. Republic Steel's low alloy martensitic steel, AISI 4340.

2. Universal-Cyclops' hot work die steel, Thermold J.

3. Armco's precipitation hardening stainless steel, 17-7 PH.

4. Universal - Cyclops' precipitation hardening stainless steel, Uniloy 17-4 Mo.

• First, tool forces were measured with an orthogonal turning setup. Engineers used a horizontal milling machine with a chuck holding a tubular workpiece 2⅛ in. in diameter, with a ¼-in. thick wall. The tool post was held on the machine table.

A workpiece temperature of 1000° F reduced the cutting force (down onto the tool) 40 to 50 per cent below room temperature levels and cropped the thrust force (in the feed direction) 33 to 66 per cent.

The tests also showed that elevated temperatures reduce the shear strength of the workpiece (the secret to easier cutting), that they ease chip formation, and that they can boost the efficiency of cutting by 40 to 50 per cent. Efficiency is defined as the cubic inches of metal removed per horsepower, per minute. Further, the tool material makes a difference, apparently because of both frictional and thermal conductivity properties.

• Lathe turning tests proved that hot machining can add to tool life. Because of the steel strike, only two steels were available for these tests, Uniloy 17-4 Mo and AISI 4340.

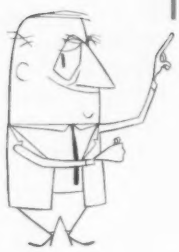
In cutting 600 Brinell, AISI 4340 steel at 170 surface feet a minute, tool life is increased from less than 2 minutes at 76° F, to 2½ minutes at 300° F, to about 13 minutes at 600° F, and to about 35 minutes at 900° F—a twentyfold increase over-all. If you're looking for a 20 minute tool life, you'd machine at 95 sfpm at room temperature, or 205 sfpm at 900° F, more than double the production rate.

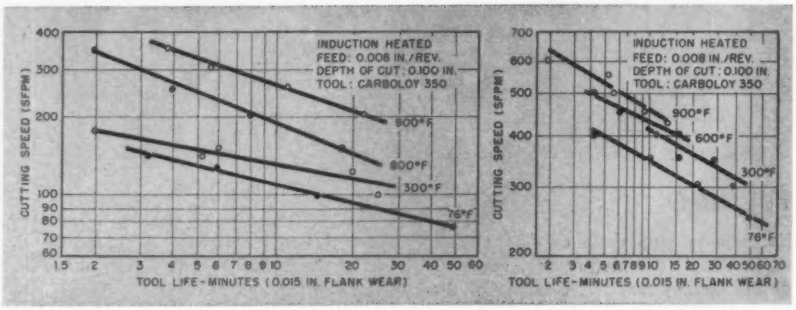
The results for 400 Brinell Uniloy 17-4 Mo are not as dramatic, but at 450 sfpm, the room temperature tool life is about 2½ minutes. It's 7½ minutes at 600° F and about 11 minutes at 900° F.

Surface finish was excellent in all the tests, though some oxidation occurred at the highest temperatures.

• High temperatures paid off in face milling too, but two variables turned up. On 380 Brinell Uniloy 17-4 Mo,

How Hot Machining Pays Off





These five curves show how hot machining can pay off. Except for drilling (at right), the relationship between cutting speed and tool life improves with higher workpiece temperatures. In the milling charts, the 1000° F performance of the high property materials is shown to be nearly comparable with the room temperature performance (73° F) of soft, C1018 steel

the speed that wore out a single tooth carbide cutter in less than ½ minute at room temperature gave up to 50 minutes of life at 1000° F. At that temperature, the material machined with about the same ease as soft C1018 steel.

Similar results were realized with a 390 Brinell Thermold J die steel.

In face milling tests, the angle of engagement of the cutter with the work markedly affects machining ease. The optimum angle seems to be about minus 10 degrees. (You can picture the angle this way: Look down on a cutter that's spinning clockwise. If the cutter were exactly half in the face milling cut, the teeth would strike the work at zero degrees, perpendicular to the work edge. Move the cutter so that less than half of it is in the cut; the cutter now strikes the work at a backward or minus angle, as at the 1 o'clock position on a clock face.)

The second variable that seemed to boost tool life was the presence of a sheet of asbestos at the engagement side of the workpiece. The cutter cut asbestos first, then steel. Three reasons can be cited for the gain: 1. The insulator keeps the surface temperature about 10 per cent hotter than a surface not protected. 2. The asbestos may react chemically with the work or the tool to form a lubricant. 3. The asbestos provides a damping effect, reducing the severity of the impact of cutter on workpiece.

• Preliminary drilling tests look least promising of the machining methods tried.

Although some levels of elevated temperature brought about slight improvements in tool life for both high speed and cobalt high speed steel drills, the increase was not great enough to warrant hot machining on the material tested (AISI 4340).

Hot machining contributed to added tool life of carbide tipped drills, but only when the holes were shallower than the length of the carbide tip. When deeper holes were drilled, the drill shank fractured at the base of the insert because of the restrictions in chip flow.

Even with modified tool geometry, hot machining did not assist the drilling of AISI 4340 steel with solid carbide drills. The geometry was changed to eliminate binding and pickup on the margins and to improve the support of the primary cutting edges.

Room temperature drilling gave the best tool life; 400° F workpiece temperature gave the worst. The steel loses strength slowly as temperature climbs through the lower ranges. Thus, the bulk of the drill is heated by the workpiece, resulting in higher tool-chip interface temperatures without much loss in strength of the work. Tool life is better at 700 and 1000° F than at 400° F, but at this level tempering of the workpiece is already severe, due to the bulk heating of the work rather than controlled localized heating made possible by induction heating used in turning and milling.

The company adds that hot drilling may be successful on materials which they have not tested.

• Most of the tests were made with induction heating, but six other methods were evaluated.

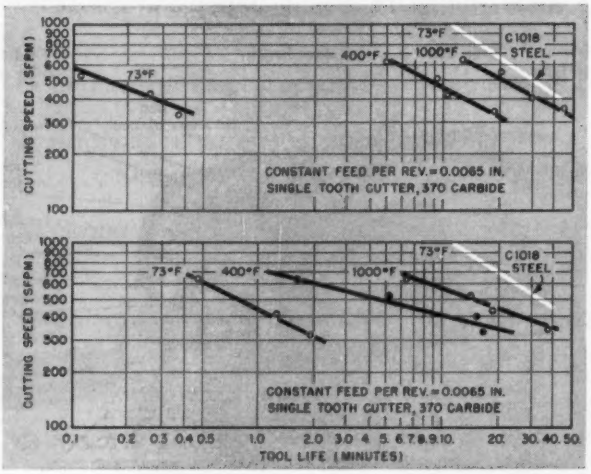
The company says the ideal heat source should raise work temperature fast, confine the heat to the shear zone in which the chip is formed, be easy to control, provide a wide range of constant temperatures, permit reproducible results, be inexpensive, easy to set up, and safe for the operator.

Flame heating, the company concludes, is flexible and inexpensive. It is limited in its capacity to provide high, localized heat and has a long heating time. Also, there is the possibility of surface damage to the newly machined surface.

Induction heating allows high specific heat input so high temperatures may be reached in a short time. Localization in temperature depth is easy, the researchers report; control is simple, and results are reproducible. The heating is limited by the permeability of the metal. On some configurations, coil design will be a problem, and the equipment for induction heating may be expensive.

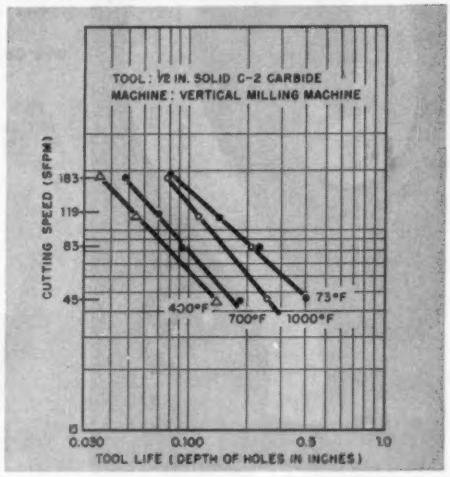
Furnace heating is relatively

FACE MILLING
Top: Uniloy 17-4 Mo, 380 Bhn
Bottom: Thermold J, 390 Bhn



DRILLING

AISI 4340, 509 Bhn



simple and inexpensive, but it depends on the machine tool being close to the furnace. It provides through heating, which can be good for drilling, but it also is a limitation because work could distort from uneven cooling. Permissible temperatures are limited to those below the tempering temperature of each material.

Resistance heating passes alternating currents through the workpiece or through heating elements embedded in the holding fixture. It provides the advantages and limitations of through heating. Special precautions must be taken to prevent arcing. Control is easy and accurate.

Arc heating, drawing a heating arc from the negative side of an arcwelding machine to a grounded workpiece, supplies a large amount of heat in a small area. Equipment is relatively inexpensive, but temperature control can be difficult, the engineers say. Special operator protection is a must, and the protection (such as welding hoods and gloves) reduces the operator's efficiency.

Radiant heating provides through heating, but to get sufficient heat, the setup often causes short life in the radiant lamps.

Radio frequency resistance heating has an advantage over conventional resistance heating in that it tends to pass the current along the route of least impedance—heat can thus be applied along a controlled path (instead of a straight line) between the contact points. Heat localization is good; control is simple; but the equipment is expensive, and some damage can occur as a result of arcing.

• Effects of properly controlled hot machining on the work material are normally not severe.

At both 390 and 570 Brinell hardness levels, the grain structure of Thermold J did not change as a result of hot machining. The hardness of the 390 Brinell sample remained the same after machining, but the higher hardness workpiece lost about 4 points Rc for about ½ in. below the surface during machining.

On a 360 Brinell (double aged) Uniloy 174 Mo sample, hot machining produced a loss of hardness to a depth of about ⅜ in. A change in microstructure was also noticed, perhaps due to a change in composition in the surface layers, brought about by a reaction with heat treating furnace atmospheres. A harder piece (380 Brinell) showed a decrease in hardness to a depth of about 1 in., but there was no change in microstructure.

Samples of 17-7 PH steels were tested at both 360 and 390 Brinell. In both cases, there was some loss of hardness, which company engineers say may have been caused by the material makeup rather than by hot machining. In neither case did the microstructure of the samples change as a result of hot machining.

AISI 4340 steel was checked in the 390 and 540 Brinell samples. There was no change in microstructure. In both cases, there was some loss of hardness due to tempering at the hot machining temperatures.

All the above samples were induction heated during machining. For a comparison, the company ran added tests on the AISI 4340 materials in which the heating was done by radio frequency resistance apparatus. The resistance heated specimen lost less in hardness than did the induction heated parts, due to more effective heat localization.

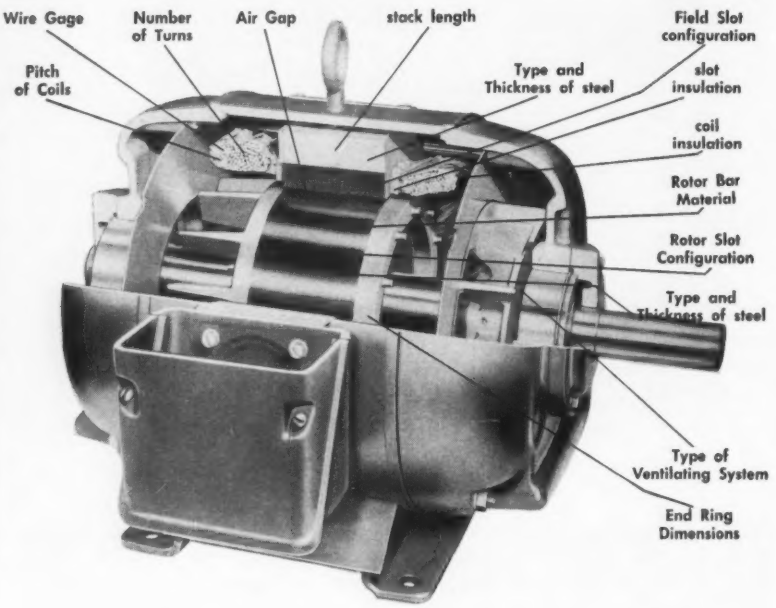
Workpieces will distort due to uneven heating and cooling. The problem, says the company, can be alleviated by correct heating methods.

In the company's recommendation to the Air Materiel Command, it cited the need for further research on techniques for concentrating heat in the zone of plastic deformation.

The company suggests that the continuation of machinability tests should be de-emphasized in favor of work on improvement of heating techniques. Reason: The tests prove hot machining works on some of our toughest machining jobs. Now the art needs refinement.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

How Would You Choose One Design from 20 Million?



Designers Are Putting Computers to Work

Letting an IBM 650 do the math gives engineers and designers far more time for creative work. Exhaustive computations often turn up solutions to "impossible" designs

"COMPUTERS not only save us hundreds of engineering manhours. They produce the best possible designs."

That's the opinion of Robbins & Myers Inc., Springfield, Ohio. Says A. E. Hartman, development engineer: "Instead of slide rules which could produce only a handful of designs for electric motors, engineers now have at their fingertips some 20 million design possibilities which can be reached in a few thousandths of a second."

• **Two case histories illustrate the speed and value of a computer in turning out new, unusual designs.**

One afternoon, a prospective customer asked Robbins & Myers to design and build an electric motor in two days. The company had no previous experience with the performance ratings (1/12 hp, 830 rpm, with a permanent split capacitor).

Four designs were prepared—two for 4 microfarads and two for 5 microfarads. Manual calculations would have been extremely long; and accuracy would have been questionable. The computer supplied four pages of data for analysis. By 5 p.m. the same day the inquiry was received, the company had selected a design (3½ mfd at 250 volts). Production began the following day; the test sample was ready on time.

The final product tested so close to the computer's design, it was shipped at once. It was the first time the company had ever designed an 8 pole motor around the set of laminations selected. The job couldn't have been done without the computer.

Second case: A 5 hp, 1725 rpm, single phase motor. The customer covered every facet of motor performance in his specifications. Little or no tolerance was allowed.

The company started work on the design several months before the computer was installed. It seemed impossible to match every condition by using manual calculations alone. Several designs were selected and tested, but none passed.

After six months, the engineers were ready to throw in the sponge. Then the computer arrived.

"The previous work permitted us to feed in data pretty close to the final answer. In an hour, the computer had given us 24 new designs to start on," explained Mr. Hartman.

The one finally selected ade-

How Design Staff and Engineering Programing Group Solve Problems with Computer

- Engineers select appropriate problems, then . . .
- Analyze requirements, make assumptions, write performance specifications . . .
- Group or staff translates problems into computer programs sending them to . . .
- Computer operating staff which simultaneously feeds specifications, data, and program to computer which . . .
- Makes decisions to accept or reject, and prints data reports as requested by operating staff for use by . . .
- Motor design staff which analyzes results, makes modifications and, when necessary, repeats all the preceding steps to obtain the best possible motor design.

quately met all the customer's specifications.

• Computer purchases can seldom be justified on cost savings alone.

Increased design quality, more efficient use of engineering manhours offer more opportunity for justifying computer purchases, say experts. Management must ask itself: What's it worth to us to turn out the best possible design? Can we compete better if we beat deadlines on special designs? Will improved mathematical accuracy pay dividends?

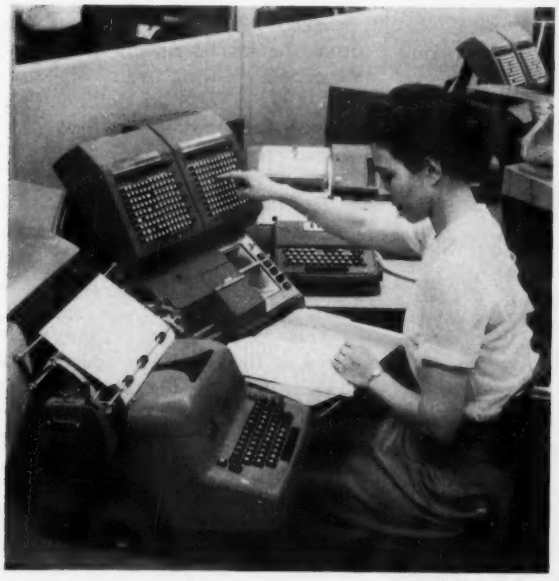
The answers are often intangibles, but the first computer is the one most difficult to sell to management, notes Mr. Hartman.

• How the company designs a motor with a computer.

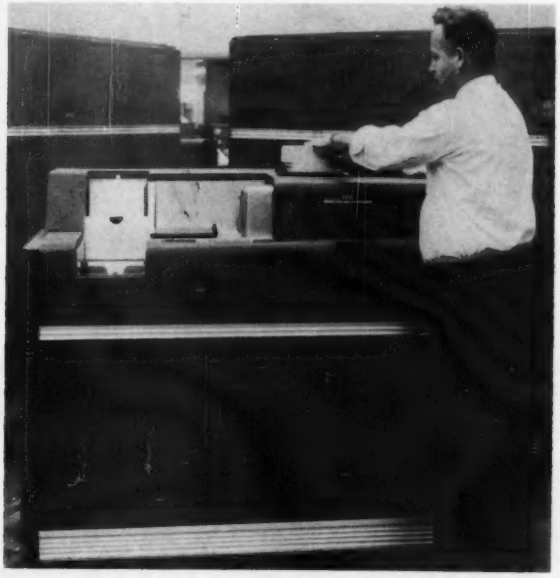
When designing a polyphase electric motor, you must consider about 27 variables, including wire size, windings, stack, slot configuration, and rotor alloy. The designer then has 5 nonillion (5 followed by 30 ciphers) possible combinations from which to choose a few optimum designs. (Experience can bring that down to something less than 20 million choices.)

With only a slide rule, an engineer simply can't cover all those possibilities, but a computer can make certain "programed" decisions and narrow selection down to say 100 decisions in just a few minutes.

Once supplied with computer-predigested facts, an engineer must rely on a clear interpretation of specifications, a grasp of duty conditions, intuitive judgment, and his understanding of production costs.



After engineers have narrowed selection of variables, the staff translates problems into computer programs for . . .



Computer operating staff which runs specifications through device, furnishing designers optimum combinations

Builder Sees Limit to Moves Abroad

He scotches a rumor that his firm will build overseas, ship machines back. His reasons for staying in U. S. will apply to most other machine tool builders too

A RUMOR that some U. S. machine tool builders will make all their machines abroad, shipping them back to this country for assembly or simply for tooling, has been running hard. But one builder reported ready to make such a move told STEEL it would not be done.

He also explained why that kind of flight abroad will not become even a small trend in the industry.

• A healthy market abroad is putting the bite on foreign capacity, the builder said.

His foreign plant is loaded with orders from European buyers. His most critical problem right now is to get the capacity of that plant up to meet the demand. Rather than bringing parts or machines back into this country (he had considered the former), the domestic plant is shipping to the foreign plant.

The purpose of machine builders' moves to get foreign capacity is designed to help them compete abroad, and in almost all cases the move is paying off.

• A total move would be too dangerous to make it worth while, the builder interviewed asserted.

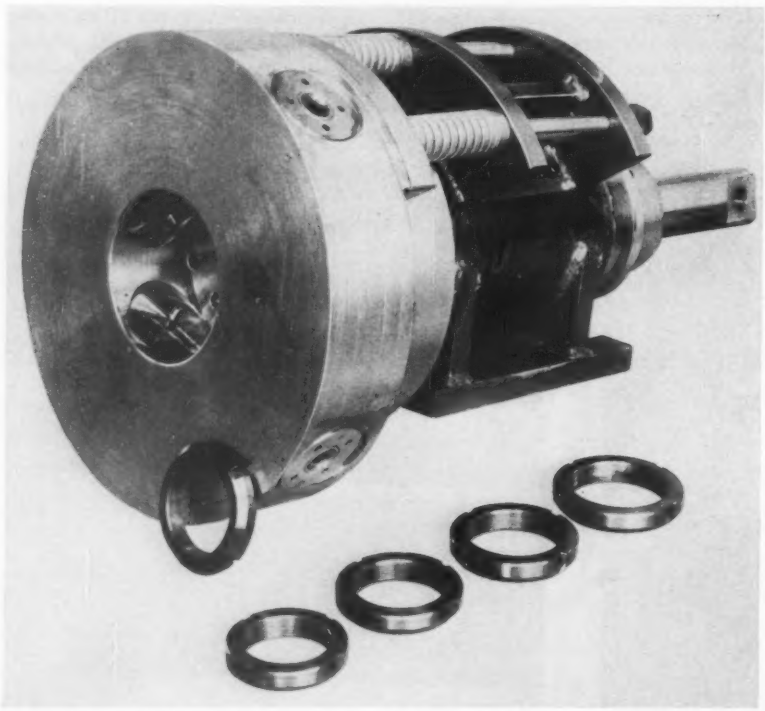
"We have no intention of working ourselves into a position where a political whim or a military maneuver abroad could put us out of business," he emphasized.

He insisted it would be foolish for him, or any other successful builder, to abandon the relative stability of the U. S., still the industry's most profitable market place.

Most builders feel that their closeness to the U. S. market is one of the strong competitive advantages they have over imported machines. They sell hard on the advantages of local engineering assists, particularly on special machines; they talk about their ability to put all the home office and plant experts to work on a problem, and to have them available at all times.

The builder told STEEL his foreign plant will continue to be used to compete in a vigorous foreign market. His domestic plant will continue to compete here. Neither will become the sole plant of the company unless an emergency arises. In that case, the foreign plant will be the one to go.

His final comment about the rumor of a total move to Europe for his company: "Nonsense!"



This tool is designed to mill the four slots in locknuts while the parts are spinning on a multiple spindle, automatic screw machine. For more information on how it works, see the article at right

Four Slots Milled at Once

If you have some secondary slot milling to do on screw machine products, you might get an idea from the tool engineers at the Indianapolis bearing plant of Link-Belt Co. They are milling four slots in lock nuts in one pass of a special tool on six-spindle automatics.

The tool (see photo at left) is a rotating, chucklike holder with a hole in the center that feeds over the tubular stock used to make the nuts.

This tool rotates at the same speed as the spindle so the relative velocity between the work and the tool is zero.

Four milling cutters that spin as the tool turns are spaced 90 degrees apart in the center hole.

Without a spindle stop—without a secondary operation, the milling is done in one pass of the tool as part of the multiple spindle machine cycle.

WHY BUY METAL YOU DON'T USE?

Switch to Allegheny Ludlum Cast-to-Shape Tools

FORGED DISC

Forged disc necessary for fabricating welded tube mill roll.

CAST-TO-SHAPE TOOL STEEL

Cast-to-shape welded tube mill roll. 220 lbs. lighter than forging; $780 cheaper for finished shape.

$780 Saved by changing to Cast-to-Shape

Why pay for metal that ends up chips on your floor? Here are two pertinent reasons why you should stop hogging your complex tools from blocks of metal and let Allegheny Ludlum cast them to shape.

CAST-TO-SHAPE MEANS YOU BUY FEWER POUNDS OF METAL.
For example, the roll shown above is 220 pounds *lighter* in the rough state than its forging cousin. Allegheny Ludlum cast-to-shape tools are more economical than tool steel forgings, *and* just as strong in certain applications.

CAST-TO-SHAPE MEANS LESS FINISH MACHINING.
This is especially important with a complex shape. For instance, the casting above has only ¼ to ⅜ inches of machine stock on its surfaces, requiring only one roughing and one finishing operation. Estimated savings by using an Allegheny Ludlum cast-to-shape tool amount to $780.

7271

Allegheny Ludlum, a tool steel producer who makes cast-to-shape tools, casts them with the same precise quality control for which their tool steels is known. A full line of cast-to-shape tool steel grades is available. You'll find ones with high resistance to abrasion, compressive strengths of approximately 400,000 psi, easy machinability, hardening with almost no distortion, toughness, high red hardness, and the capacity to take a high polish.

Find out now how you can cut costs on your complex tools. Write for FC-4, a 28-page technical discussion of A-L's Forging and Casting Division with applications, pattern information, design tips, analyses, and heat treating instructions. Or call your nearest A-L tool steel warehouse or distributor.

ALLEGHENY LUDLUM STEEL CORPORATION, OLIVER BUILDING, PITTSBURGH 22, PENNA. Write to Dept. S-6-3.

ALLEGHENY LUDLUM

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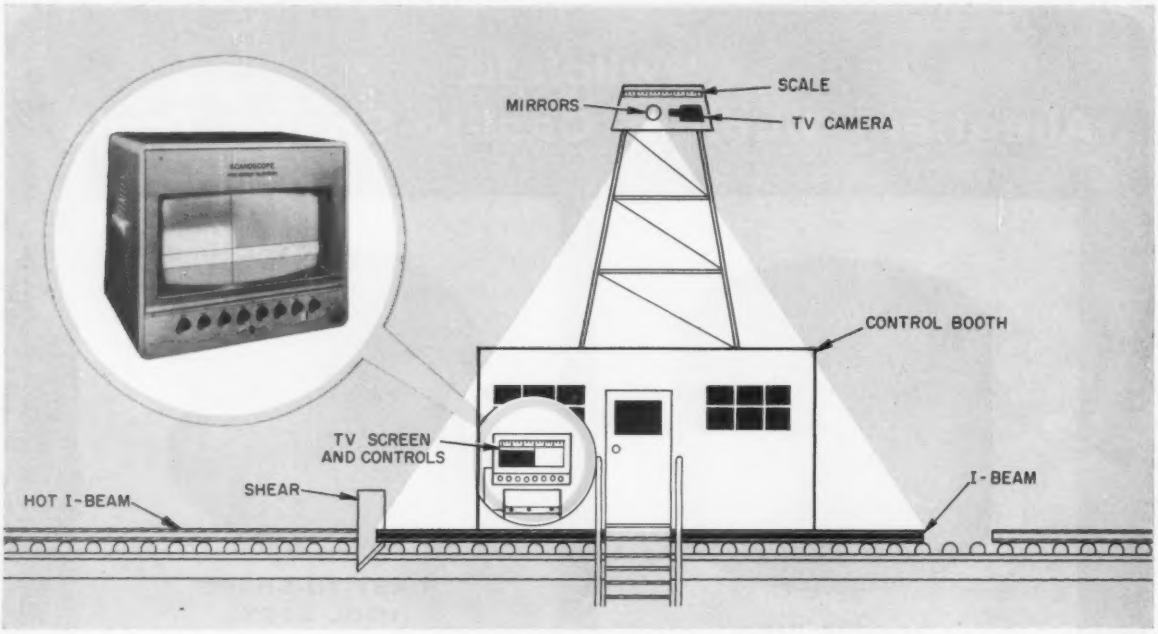
EVERY GRADE OF TOOL STEEL . . . EVERY HELP IN USING IT



Camera is aimed at the line of intersection of two mirrors, viewing the dead end of the I-beam and an illuminated scale simultaneously. The combined image is relayed by closed circuit television to a monitor set in the shearman's booth

Television Setup Tells I-Beam Length

MEASUREMENT of steel structural members with a noncontact gaging system that uses closed circuit television was reported at a meeting of the Radio Club of America, New York, by Charles D. Bryant, chief engineer, Grimson Color Inc., Inwood, N. Y.

The system, called Video Telegauge, was developed by Grimson Color. It has been installed in a large Eastern rolling mill, where it measures I-beams as they are cut to length at the hot shear.

• The I-beam and an illuminated scale are viewed simultaneously by a television camera. Length is read out on a monitor screen.

A television camera, mounted on a tower above the shearman's control booth, is aimed at the intersection line of two mirrors, crossed at 90 degrees. Mirrors are mounted on an axis and can be rotated from the shearman's booth.

An illuminated scale is mounted behind the mirror system. Its perpendicular distance from the mirror intersection is adjusted to one-twelfth that of the measurement plane. Line of sight of the camera is parallel to the scale and the measurement plane.

A rotation of the crossed mirrors which moves the line of sight 1 in. on the scale indicates a movement of 1 ft on the structural being measured.

The face of the shear is used as a zero reference point. Measurement is made by sighting on the end of the beam blank on the roller bed and determining the distance to the shear face.

• The camera lens system is compensated to bring both images into sharp focus.

The lens system is designed so the image of the scale (reflected from the lower mirror) focuses at a closer point than the image of the measurement plane, reflected from the upper mirror. That puts both images in sharp focus on the monitor screen.

A vertical hairline on the monitor screen is used as a measurement reference. Rotation of a control on the monitor panel rotates the mirror assembly, so the required beam length on the scale coincides with the hairline. The beam blank is then moved along the roller bed and stopped when the image of the beam end coincides with the hairline.

The image that appears on the monitor screen is expanded horizontally for better resolution.

In tests made at Grimson Color's laboratories, beam lengths up to 36 ft were cut with an accuracy of plus or minus $\frac{1}{8}$ in., says Seymour Rosin, Grimson's president.

• The equipment is said to be easy to operate and inexpensive to maintain.

After the system was adjusted to

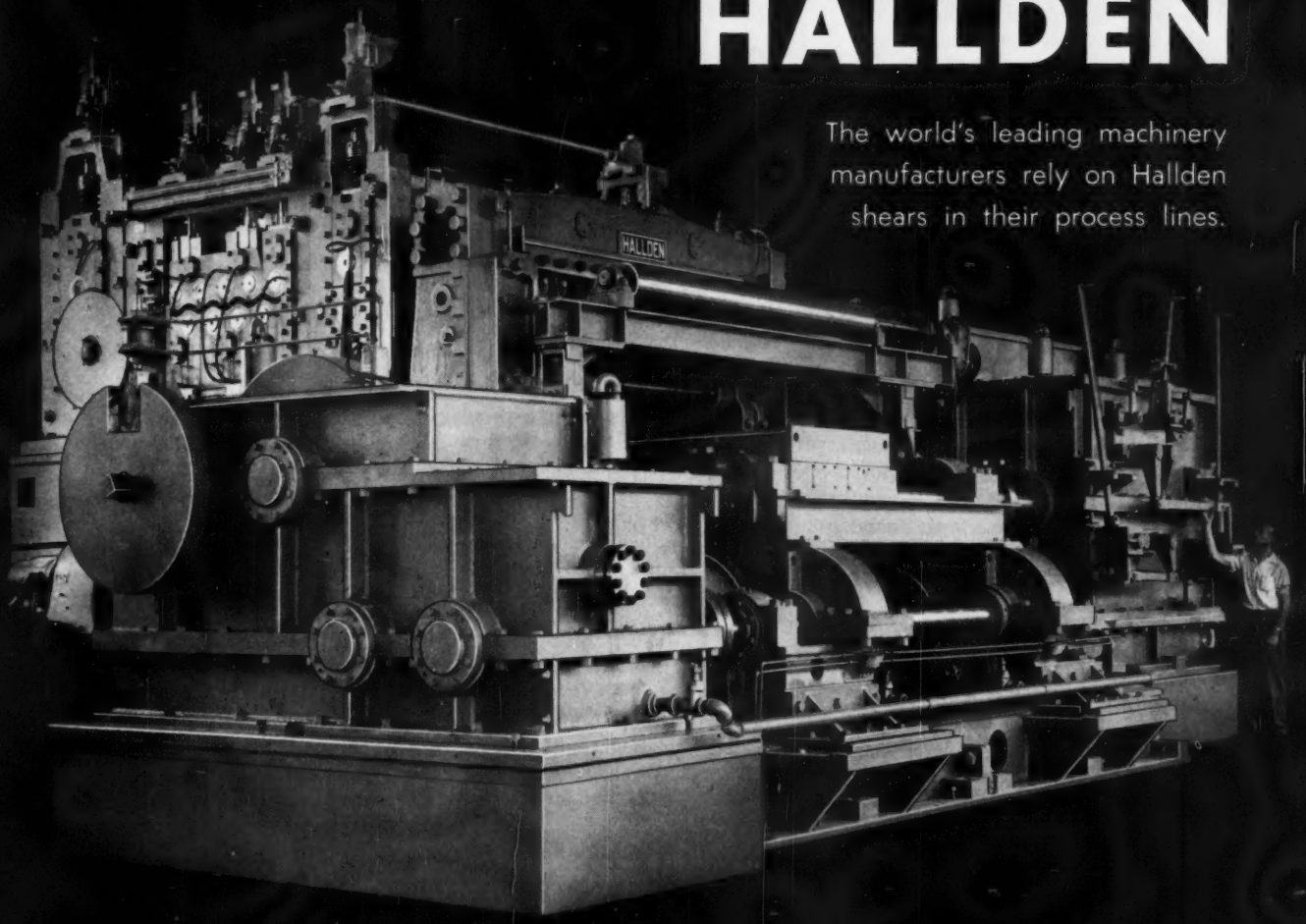
550,000 POUNDS OF PRECISION

The Guillotine Shear's superior cut on heavy gauges, synchronized on the fly

Another Hallden First — type 76 Guillotine Flying Shear, the world's largest, for continuous strip shearing — up to 5/8" thick, 100" wide aluminum — at ***two cuts per second.*** This new Hallden installation can cut mild steel up to 3/8" thick and 90" wide, with cut lengths infinitely variable up to 48 feet. Change of cut length and synchronization may be made while the Shear is in operation. For every high-production shearing application consult the shearing specialists.

HALLDEN

The world's leading machinery manufacturers rely on Hallden shears in their process lines.



THE HALLDEN MACHINE COMPANY • THOMASTON, CONNECTICUT

Associates: The W. H. A. Robertson & Co., Ltd., Bedford, England

obtain the correct scale factor, it was put into operation 20 shifts a week. That allows more than enough time for routine inspection by maintenance personnel.

Shear operators required minimum training in the use of the equipment. They are enthusiastic about its simple operation and its value as a measuring tool.

• The device helps meet the need for equipment to measure hot steel while it is being processed.

Accurate determination of structural lengths at the shear reduces waste and eliminates undersize lengths which would require reprocessing. Similar savings can be realized by using the same measuring principles in other areas.

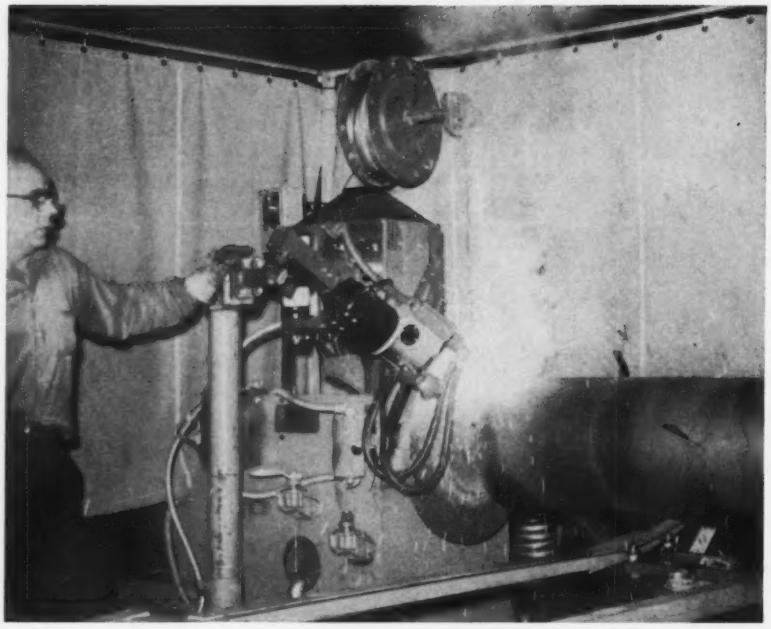
Previously, measurement of hot steel in process depended on the operator's eye or on crude calipers and yardsticks, which put workmen close to the hot metal. And the temperatures of the steel during processing (1500 to 2200° F) made for errors that became noticeable when the metal cooled and contracted. Contact gaging might also deform the hot steel, the company says.

• The company is developing video devices for other measuring applications.

Inquiries have come to Grimson Color for solution of other noncontact measuring problems in the steel industry. Some of the problems can be solved by minor modification of the original system. Theoretical solutions have been found for most problems, and prototypes are being developed.

One of the systems will measure ingot height and width; one will measure the diameter of round forgings; another will perform as a comparator and computer, feeding digital information to a remote point for display or printing. It will measure lengths up to 90 ft from a distance of 30 ft away from the measuring plane. Expected accuracy: Better than 0.2 per cent. Replacement of a computer part will permit measurement of longer lengths from a greater distance, Grimson officials say.

Two or more of the comparator-computers may be teamed up to measure two or more dimensions simultaneously.



Girth seams on water heater shells employ self-shielding method, attaining weld speeds of 155 to 175 ipm. Head is held at 35 degree angle, about 3 in. down hill

Heatermaker Joins Tanks Automatically at 175 ipm

AUTOMATIC WELDING without flux or shielding gas means quality and economy for Temco Inc., Nashville, Tenn., in making small, glass lined water heaters.

The firm gets full weld penetration in a single pass with a cored wire system called Innershield, says Lincoln Electric Co., Cleveland. Longitudinal seams are said to be run at 175 ipm, girth seams at 155 ipm—speeds formerly thought unattainable. (Other firms report doing the same job between 100 and 120 ipm with submerged arc.)

• Steel tanks are 13 gage, 14 by 44 in. long.

The shell is roll formed, raised from a storage conveyor to a stake fixture which is about 10 degrees out of level. No preliminary tacking is necessary.

The welding head travels down a rail at an angle of 35 degrees to the tank seam. A foot control clamps the shell and attaches an electrical ground clamp.

Girth welding is handled in a separate setup.

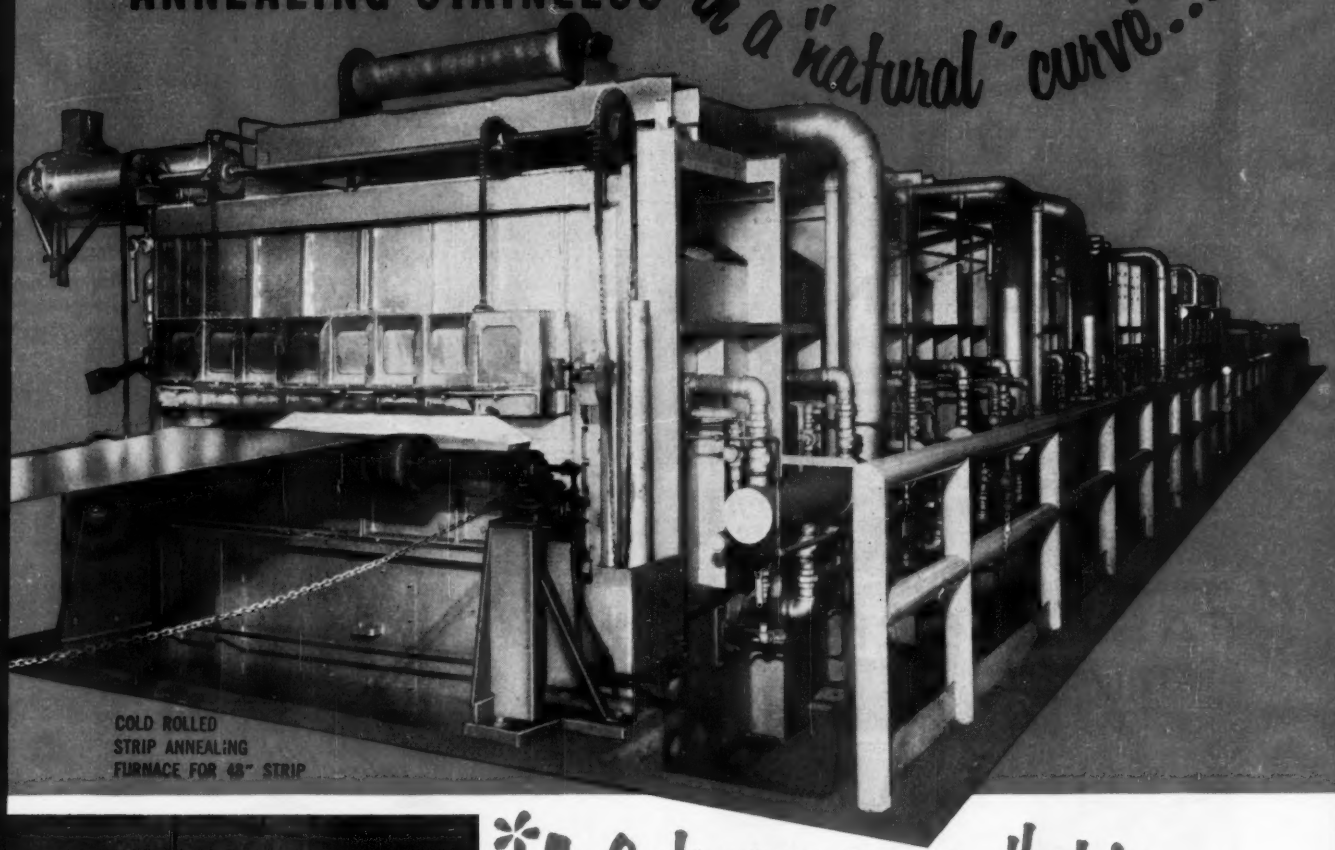
• The operator simply presses a start button and observes the action.

A hollow tubular wire, 5/32 in. in diameter, is fed continuously to the arc as the head traverses the seam. A special core material contains flux ingredients, deoxidizers, and chemicals which generate a gas shield. No other flux is necessary, a feature considered an advantage by some since no flux control, handling, storage, or pressurized gas containers are needed.

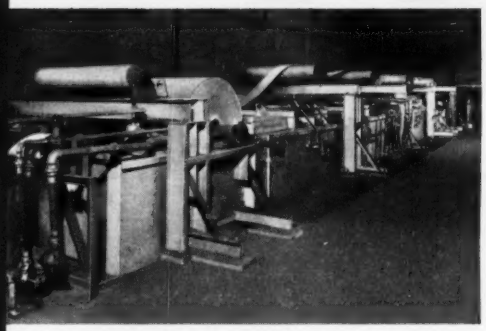
Temco reports it gets full penetration with a single pass. To insure a perfect glass seal, the inner seam is ground smooth.

After the tank has been enameled, bottom and skirt are assembled. A final water test checks leaks: Less than 1 per cent of production must be returned for repair of porous seams.

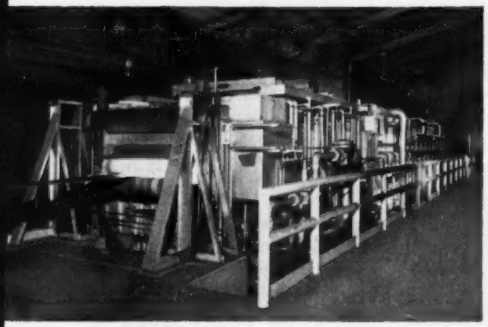
ANNEALING STAINLESS in a "natural" curve...



COLD ROLLED
STRIP ANNEALING
FURNACE FOR 48" STRIP



ABOVE: SALT DESCALING BATH. BELOW: HOT ROLLED STRIP LINE.



*A Catenary curve, that is...

...the natural path assumed by the strip as it passes through the continuous Annealing Furnace. Complete exposure of the strip surface to heat and furnace atmosphere and the uniform stress throughout the strip assure maximum product uniformity. Support of the strip by special soft compressed asbestos disc rolls located outside the ends of the furnace assures an unmarked surface.

STAINLESS STEEL HEAT TREATING SPECIALISTS

The support of the strip on special rolls and the proper application of thermal conditions are but part of the engineering technique and heat treating experience that enter into the design of Drever Stainless Strip Annealing and Descaling Lines. Keeping pace with the ever growing demand for heat treatment of stainless steel in all its forms has been a particular project at Drever. This specialization is reflected in the number of successful installations, in many sizes, now in operation.

DREVER ENGINEERING FOR YOU

The widening industrial and commercial use of stainless steel and the higher quality standards point up the need for producers to study the latest methods of heat treatment. Consult with our engineers regarding your requirements—or ask for Bulletin B-81. Drever Company, Bethayres, Pa. Phone: WIlson 7-3400.

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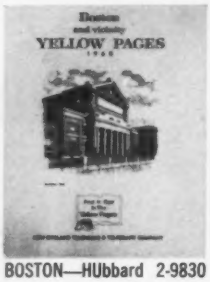

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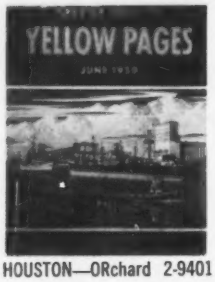

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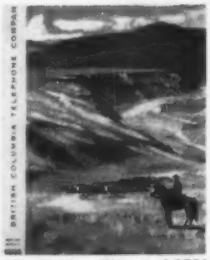

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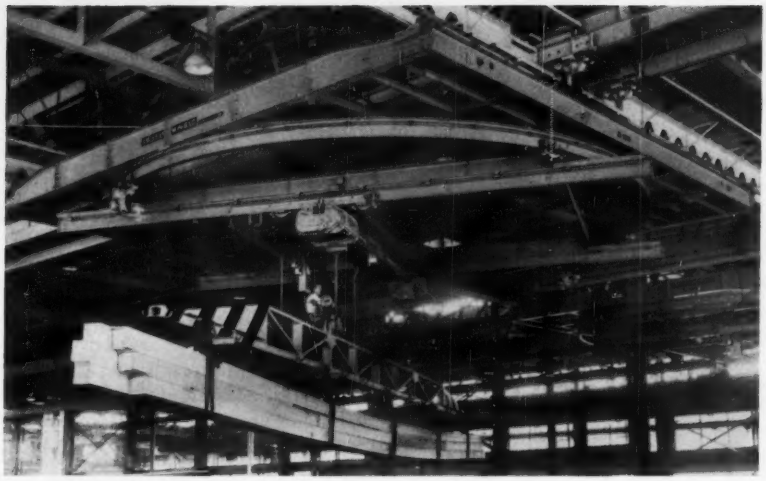


Loads weighing up to 10 tons can be moved and rotated by this turntable crane. Two units are used to handle tubing during processing

Material Handling System Moves Problem Bundles

Turntable crane can move 80 ft bundles of tubing from cars and deposit them within 5 ft of a wall. Tubing can be rotated 360 degrees in any area of the plant

EXPANSION of a building in which nickel alloy tubing is processed posed several material handling problems at the Huntington, W. Va., plant of the Huntington Alloy Products Div. of International Nickel Co. Inc.

1. A crane had to be developed to handle 10 ton bundles of tubing up to 80 ft long. 2. The tubing had to be placed within 5 ft of the center line of the columns in the building, or within 5 ft of the building walls. 3. The crane load had to be rotated up to 360 degrees during movements between processes.

• **Solution**—Inco worked with American MonoRail Co. (Cleveland) to develop the crane. The first proposal was a double bridge crane with a carrier containing a circular track. It could handle the load and rotate it, but it would not place the bundles close enough to the wall.

The final solution was to mount a set of runways below the circular track section; a twin hoist carrier and cab unit was mounted under the runways.

• **Efficiency**—More efficient use of the building is possible because the crane can deliver a load within 5 ft of a wall or row of columns. With the first system, a load couldn't be brought closer than 15 ft. Inco figures operating area costs at about $25 a square foot.

• **Safety**—The safety angle is important, say Inco engineers. With this crane arrangement, the load is completely under control during rotation. When a one-hook crane was used to rotate the load, ropes were put at each end of the bundle, and men controlled the movement. Production in the area was often disturbed while machine operators got out of the way. Walking the tubing around also involved climbing over equipment.

• **Tube Processing** — The tubing handled by the cranes comes from the pickling process by rail. From the rail car to processing in the first bay, the crane must turn the tubing 90 degrees. After reaching the end of the first bay, the tubing must be rotated to start down the adjoining bay. After processing through three adjoining bays, which includes annealing, lubricating, pointing, and drawing, the tubing is stored or readied for shipment.

Chemical Treatment Cuts Porosity of Thin Plating

A solution of ammonium persulfate, replacing a conventional acid pickle in the preparation of copper surfaces for electroplating, substantially reduces the porosity of thin electrodeposits, reports Becco Chemical Div., Food Machinery & Chemical Corp., Buffalo. A 25 per cent solution of the chemical, followed by a warm water rinse, is used.

• **Keeps It Clean**—Use of the ammonium persulfate solution, Becco states, results in an unusually clean surface on the copper. The surface is free from oxides and does not reoxidize quickly. The company believes that this characteristic is responsible for the reduction in porosity and the improved adherence observed in the tests made at FMC's Chemical Research & Development center at Princeton, N. J.

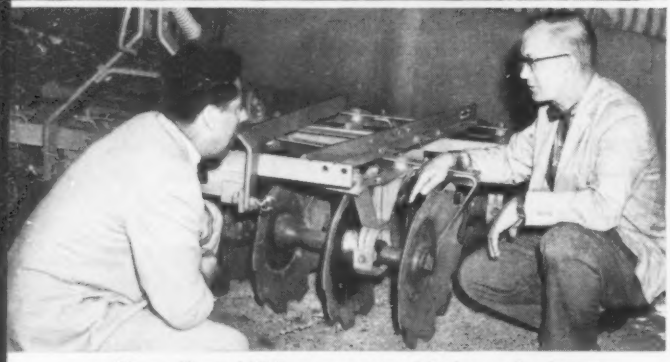
An example of results: A hard nickel plate 0.0003 in. thick was applied to a copper substrate on samples prepared in the ammonium persulfate solution. It was compared with the same thickness of hard nickel, plated over acid pickled copper. Becco noted a 73 per cent reduction in the number of pinholes when the persulfate solution was used. When a bright cyanide gold plate 0.0002 in. thick was used in similar tests, an 85 per cent reduction in pinholing was observed.

• **Equipment No Problem** — The solution can be used in tanks made of wood, stainless steels, stoneware, plastic-lined steel, or plastics such as methyl methacrylate. If tarnish removal is all that is required, shorter treatment times can be employed.

Since copper is used as an intermediate layer, or base, the company expects the process to be of interest in many industrial plating operations.

Allis-Chalmers uses **RYKON** *Grease in bearing shield—offers farmers better disc harrow*

can **RYKON** Grease help you improve your product?



Above: Maynard Walberg sweeps sand back over disc harrow bearings on test stand. RYKON Grease is undergoing 2,000-hour test in this simulation of actual farm service conditions.

Below: Allis-Chalmers disc harrow ready for shipment from the plant gets inspection from Standard's Fred Parkinson and Walberg.

Maynard Walberg, Allis-Chalmers project engineer, and Standard Oil lubrication specialist Fred Parkinson, examine disc harrow bearing assembly. Fred is well equipped through training and experience to help industrial customers with lubrication problems. He has been doing this work for 11 years at Standard. He has a degree in chemistry and engineering from Brown University. Plus that, he has completed the Standard Oil Sales Engineering School.

Situation: Bearings of a disc harrow in service are always turning in dusty conditions, oftentimes completely covered with soil. Such bearings in the Allis-Chalmers harrow are protected with grease-coated rubber shields. The grease guards against dirt getting past the shield and into the bearing.

What was done: Allis-Chalmers project engineer in the LaCrosse, Wisconsin plant, Maynard Walberg, called Fred Parkinson, Standard Oil lubrication specialist, for a sample of RYKON Grease. In conditions simulating field service, RYKON Grease was tested. Bearings were rotated in the most abrasive dirt available—Mississippi sand with a high quartz fraction.

What happened: Tests were started and run to destruction. Prior to the use of RYKON Grease, bearing failures occurred at 500 hours. On switching to RYKON Grease, these tests were pushed to 2,000 hours. At this point, tests were stopped. Bearings were still in operating condition.

What you can do: Find out how RYKON Grease might help you offer your customers a better product. Inquire of the Standard Oil lubrication specialist nearest you anywhere in the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 So. Michigan Ave., Chicago 80, Ill.**

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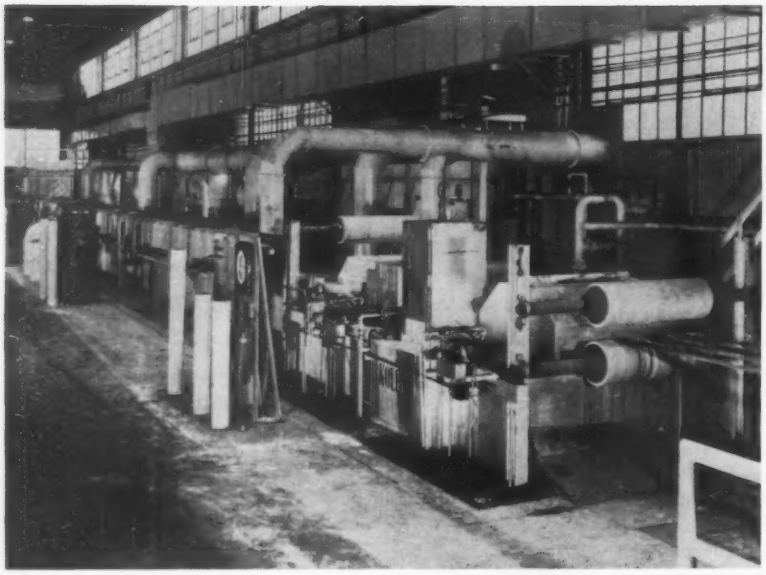
Quick facts about RYKON

- Heat stable. At sustained high temperatures RYKON Grease remains soft and grease-like.
- Resistant to water-washing.
- Mechanically stable. Minimum change in consistency in service.
- Resistant to oxidation. Thickener acts as an inhibitor.
- Exceptional rust-preventive properties.



Salt descaling furnace. The strip enters and leaves the bath through slots on each end. Insulated sectional covers keep radiated heat losses to a minimum

Salt Bath Descaling Bolsters Annealing and Pickling Line

Horizontal, catenary-type continuous line for stainless strip employs fractional motors to power rolls. Result: Less marring and scratching of steel's surface

A SALT bath dip station in the anneal and pickle line has improved the descaling of stainless steel strip (300 and 400 Series) without causing surface defects, reports Jones & Laughlin Steel Corp.'s Stainless & Strip Div., Youngstown.

A cleaner steel is the result because the annealing oxides are rendered more soluble prior to acid treatment.

The line consists of a catenary type annealing furnace, salt bath descaling furnace, quenching and rinsing station, acid tanks, and rinsing and brushing stations.

The two-zone direct gas fired furnace, designed and built by Electric Furnace Co., Salem, Ohio, anneals 1200 lb of strip an hour at 1550° F. In operation, Type 400 grades are annealed at about 1550° F and the 300 Series at 2100° F. Controls regulate the amount of oxygen in the furnace over the full range of turndown, making uniform scale production possible at all operating rates.

• The steel is conditioned by a molten salt bath process, followed by electroacid pickling.

After leaving the annealing furnace, the strip is immersed in a salt descaling furnace—the formula and equipment were supplied by Kolene Corp., Detroit. The Kolene No. 1 oxidizing salt treatment dissolves certain constituents of the oxide and converts the remaining oxides to a form more soluble in acid without attacking the surface. Excessive salt is wiped off by a roll riding on the surface as the strip leaves the tank to be rinsed and flushed with a hot water spray.

Gas immersion tubes maintain the bath temperature at 900° F. Operating temperatures can be varied from 800 to 1000° F. Insulated covers cut heat losses.

Salt additions are made from drums into a charging hood. The hood protects the operator from radiated heat or splash during charging. Initial salt charge required: 35,000 lb.

Next, the strip enters the first of two acid tanks (1450 gallons capacity each). Each acid tank has four sets of electrodes made of stainless steel covered with PVC (polyvinyl chloride) on all areas except those adjacent to the strip. Two, 500 ampere Udylite selenium type rectifiers, 12 volt maximum, furnish direct current to the electrodes.

Both tanks operate with dilute electrolytic acids—either sulfuric or nitric. Nitric hydrofluoric or other acid solutions can be employed, reports the builder.

The tanks are combined with their rinsing stations. They are lined with PVC and one course of 4 in. brick on the bottom and sides. The rinse sections are lined with brick and are equipped with sprays to insure complete rinsing.

The strip is then scrubbed top and bottom in a rinsing and power brushing station. In the final drying step, the strip is immersed in hot water (190° F) and exposed to heated (200° F) high velocity air jets.

• Marring and scratching which result from tracking and skidding on the rolls have been minimized.

All the rolls in the Youngstown line are driven by fractional horsepower motors. They are arranged, essentially as a constant torque drive but can be operated as a constant speed drive.

Over-all control of the line is at the exit end. Bridle rolls pull the strands through the line. The bridle sets the speed; the tension of the strands is controlled by torque settings of electric drag brakes on uncoiler units.

The drive for the bridle rolls consists of two, 3 hp, direct current motors, powering each roll through four-speed gearboxes. Speed ranges are 18 to 55 fpm, 11 to 32 fpm, 6 to 18 fpm, and 1 to 8 fpm.

Wanted: New Jobs For Uranium

Atomic Energy Commission has increasing quantities of depleted uranium accumulating as a result of reactor operations. Studies show number of metallurgical uses

RECENTLY released from government service by the Atomic Energy Commission, uranium is now available for civilian applications. Some of the most promising appear to be in metalworking.

The cost of the material, supplied as UF_6, is set at $5 per kilogram (2.2 lb) of contained uranium, so economics will limit uses. But a report prepared for the AEC by Battelle Memorial Institute, Columbus, Ohio, lists applications for steel, cast iron, and nonferrous metals. The authors, Harlan W. Nelson and Ronald L. Carmichael, have considered that from 10,000 to 20,000 tons per year could be supplied for civilian applications.

• Called depleted uranium, because the fissionable isotope U-235 has been removed, the material can be used in breeder type reactors, but that application is limited. So the AEC is offering it for nonnuclear purposes.

Before uranium was withdrawn from civilian applications, it had a limited number of uses in industry. Examples: Ceramic glazes, photography, glass manufacture, and as a "getter" to remove gases in electron tubes.

But withdrawal of the metal for a period of some 16 years has upset that use pattern. For photographic toners (to produce colors), improvements were ousting uranium even before wartime restrictions were imposed.

• Uranium has been investigated as an additive to steel.

Most of the work on uranium additions to steels was done during the first quarter of this century. At that time, the metal was in relatively limited supply.

Reports claimed that uranium increased the hardening power of steel without an accompanying increase in brittleness. Additions were made to high speed steel to promote the formation of complex carbides which improve cutting ability and red hardness.

These results were reported for uranium alloys:

- The A_r transformation temperature is lowered.
- They can be air hardened to a martensitic structure.
- Toughness, heat resistance, and carbide formation are promoted in high speed steels, upping tool life.
- Secondary hardening in high speed steels is increased.
- There is a possibility of increased hardness and development of secondary hardness in hot work die steels.

The U. S. Bureau of Mines Experiment Station at Albany, Oreg., is investigating the application of uranium to steels. In addition to methods of preparing the alloys, corrosion resistance, physical, and high temperature properties are being studied.

Reports show: In the melting of scrap steels containing uranium, the radioactive material is largely oxidized in the melting process and is not likely to build up in the metal as a tramp alloy.

• Additions have been made to cast irons.

A 1924 report stated that the addition of 0.1 per cent uranium caused an increase in tensile strength from 27,900 psi to 30,800 psi. It also improved transverse bending strength and produced a denser grain structure. But the limited results reported by various investigators are conflicting.

The fact that uranium is a strong sulfide former may make it helpful in the production of nodular iron.

The tendency for the element to combine readily may lead to uses as a scavenger, the Battelle scientists believe. Since the uranium oxides are not good slag formers, it has been suggested that they might aid in dispersion hardening.

• There has been recent work in the nonferrous field.

Battelle has used uranium to infiltrate a tungsten powder part; specific gravities up to 17.4 were obtained on the preliminary work, and it is believed that about 19.0 could be achieved. Such heavy metal materials are used in counterweights.

Phase diagram studies of uranium with many nonferrous elements raise the possibility of hardening a number of them. The alloys with copper and nickel have been reported to be relatively corrosion resistant. Uranium as a constituent of copper, lead, or tin base bearing metals is being investigated. And, as with steel, the metal's reactivity may qualify it as a scavenger.

The Battelle report, "Potential Nonnuclear Uses for Depleted Uranium," is designated as TID-8203. It's available for 75 cents per copy from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

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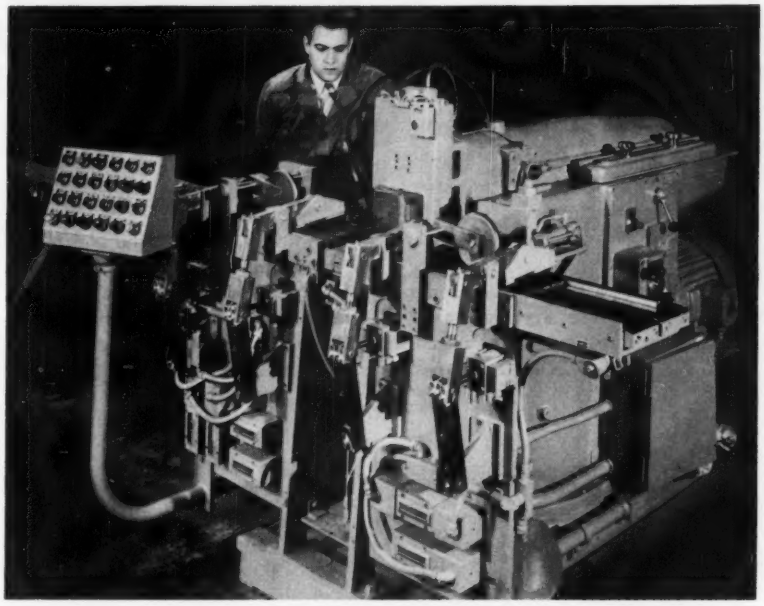
Shaper's Automatic Cycle Includes Loading

A HYDRAULIC shaper with an automatic cycle that includes loading and unloading has been developed by Rockford Machine Tool Co. The unit shown was built and installed for conveyor line production of sleeve bearings.

The unit is a standard, Hy-Draulic, 24 in. shaper (with a special crossrail and toolhead) equipped for complete automatic cycling. Transfer and index are pneumatic against gage stops.

The transfer table is interlocked with the shaper so that the cycle will be interrupted if positioning or indexing fails to function. The feed and cutting cycle is completed before transfer begins.

For further information, *write* Dept. 213, Rockford Machine Tool Co., 2500 Kishwaukee St., Rockford, Ill.

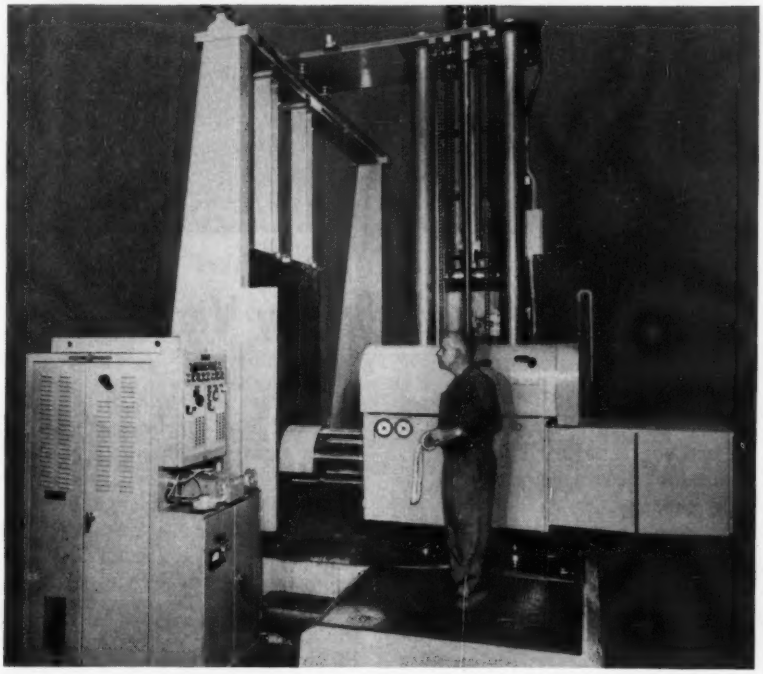


Drilling Machine Is Numerically Controlled

A NUMERICALLY controlled jig drilling machine can do program drilling of holes and parts (or groups of parts) measuring up to 10 ft square. Work longer than 10 ft but within the 10 ft height dimension can be handled by indexing the part horizontally and floating in the correct zero setting for tape programing. A part 33 ft long can be programed on one tape.

A floating zero arrangement included in the GE Mark II numerical control system enables a number of smaller parts to be clamped simultaneously in the work fixture and accurately drilled under tape control. Positioning of the single spindle drill head can be done manually, manually by decade button, or by the punched tape control. It can do gun drilling, pressure coolant reaming, grooving, or drilling with oil flute twist drills.

The drill spindle is powered by a 15 hp motor. Sixteen speeds are

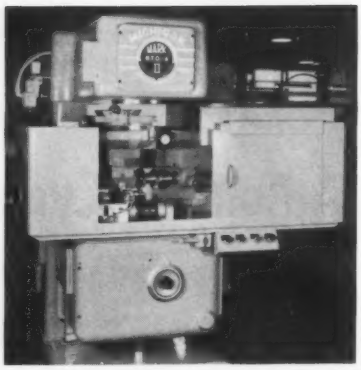


available (range, 50 to 5000 rpm). The drill spindle has feed rates up to 120 ipm. The quill has a maximum travel of 26 in.

For further information, *write* Walter P. Hill Inc., 22183 Telegraph Rd., Detroit 19, Mich.

Gear Shaving Units Have Dial Control Settings

A NEW line of rotary gear shaving machines (870 Mark II) consists of three types: An underpass, an internal, and a universal gear shaver. The universal model permits selection of underpass, modified underpass, or transverse shaving. In addition, there are three sizes for gears up to 8, 12, and 18 in. in diameter



(up to 12 in. for internal gears).

The Mark II can be shifted easily from one size, gear type, or processing method to another. Most of the machine settings are dial controlled. By setting dials and graduated scales, the universal machine will shave by underpass, modified underpass, or transverse shaving methods.

Controls and adjustments are accessible from the outside of the machine to speed job changeovers. Gear face widths up to 5 in. can easily be shaved. Rapid up-feed (0.040 in. maximum) takes less than ½ second. The units have dual start buttons and a jog button.

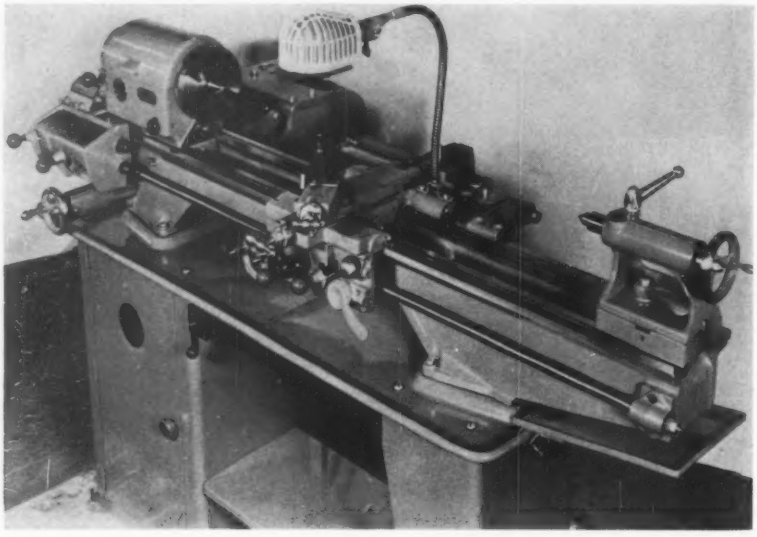
For further information, *write* Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

Units Handle Vacuum Degassing of Melts

A SERIES of foundry degassing equipment has been developed to cover capacity requirements of 300 to 3000 lb. A bell or dome is placed over an induction melting furnace to form a closed chamber. The chamber is evacuated by a vacuum pumping system connected by a manifold and a series of ports in the stationary base plate on which the furnace sits.

The fixed base design permits the continued application of reduced power to the furnace during degassing (sufficient to hold the temperature of the melt, but not hot enough to cause corona discharge).

For further information, *write* F. J. Stokes Corp., 5500 Tabor Rd., Philadelphia 20, Pa.



Lathe Speeds Are Infinitely Variable

HERE IS a long bed, 10 in. metal cutting lathe with a capacity of 36 in. between centers. The unit has a variable speed drive and a ¾ in. collet capacity.

A magnetic starter, electrical disconnect switch automatically shuts off the motor when the headstock cover is swung open. A mechanical back gear lockout protects the headstock gears. (It forces the operator to raise the headstock cover before the back gears can be engaged.)

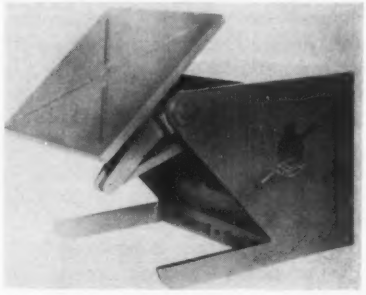
The drive has infinitely variable speeds from 15 to 1500 rpm. The unit has a quick change gearbox with 54 feeds or thread pitches. It comes with a ¾ hp motor.

For further information, *write* Delta Power Tool Div., Rockwell Mfg. Co., 471 N. Lexington Ave., Pittsburgh 8, Pa.

Work Positioners Simplify Handling of Weldments

YOU CAN facilitate welding and finishing operations with the Toggle Tilt work positioner made by World Electric Co. The machine can rotate and tilt the turntable electrically to permit downhand welding. The turntable is T slotted diagonally to allow the work to be clamped in place.

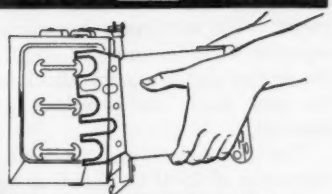
The segmented drive gear tilts the table and delivers maximum



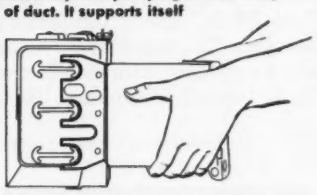
Why SQUARE D ALUMINUM PLUG-IN DUCT?

Because you want a duct that's rugged – built to thrive on heavy duty – *plus*

PLUG-IN UNITS GIVE YOU EXCLUSIVE *hook-swing* MOUNTING



Hook clip at top of plug-in unit to top of duct. It supports itself



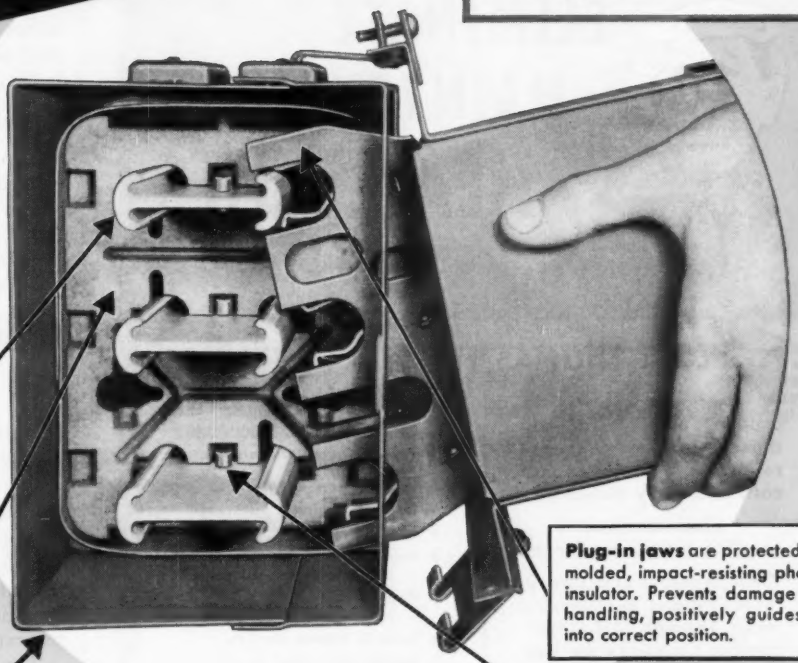
Then, just swing plug-in unit down until jaws engage bus bars

Hanger mounting (*not shown*) makes installation easy. A universal hanger permits mounting in *any* position. Just suspend and level top portion of hanger, then clip on lower portion. U.L. approved for 10-foot spacing.

I-beam construction of bus bars—a Square D exclusive—provides four times the strength of conventional bus bars. Bars are zinc, copper and silver-plated full length.

Full width bus support provides greater strength on short circuits, freedom from vibration. Also acts as fire stop where duct passes through walls and floors.

Square D duct is totally enclosed for maximum safety—no danger of accidental shorts. Prevents overheating from dust accumulation.



Plug-in jaws are protected by a molded, impact-resisting phenolic insulator. Prevents damage from handling, positively guides unit into correct position.

Steel pins in each bus bar prevent bars from shifting and support them on vertical riser installations.

With other plug-in duct, it's no easy job to mount the plug-in units. In fact, it takes a lot of real pushing which is neither safe nor easy when you're working on a ladder. With Square D's exclusive *hook-swing* mounting, you just hook the plug-in unit to the top of the duct. Then, simply swing it down and in until the jaws have engaged the bus bars. No awkward pushing required—no unnecessary chances to take. Compare Square D's rugged, heavy-duty construction with any other. It costs no more—why settle for less?

Write for Bulletin SD-110. It gives the facts on Square D aluminum plug-in duct. Address Square D Company, Mercer Road, Lexington, Kentucky

SQUARE D COMPANY

wherever electricity is distributed and controlled

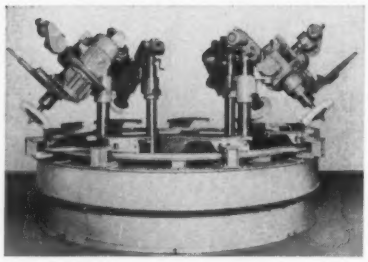
thrust with minimum horsepower, says the manufacturer. In addition, the design also eliminates shock load on gear teeth and overload gear damage.

The positioners are available in capacities of 2500 to 25,000 lb with table heights of 34½ to 95 in. The 30 to 54 in. square turntables tilt through a 135 degree arc. The units may be ordered with nonelectronic (20 to 1 ratio), electronic (100 to 1 ratio), or precision (full rpm with two cycles) variable speed controls.

For further information, *write* World Electric Co., 4614 Prospect Ave., Cleveland 3, Ohio.

Automatic Buffing Machine Has Rotary Conveyor

AN AUTOMATIC polishing and buffing machine with rotary conveyor design can finish such parts as automobile moldings, refrigerator trim, stove trim, and other parts having sweep or angular shapes.



The parts are loaded and unloaded from one position on the periphery of the machine. The unit shown is a 12 ft rotary conveyor machine set up to finish angular shaped automotive trim at a rate of 350 pieces an hour.

Four, 15 hp, Acme adjustable lathes equipped with interchangeable power drive units perform the buffing operations. The units can raise and lower the buffing head, adjust the in and out slide, or provide automatic buffing wheel wear compensation.

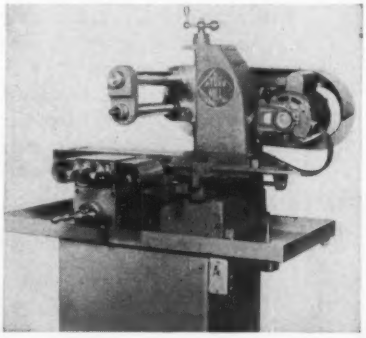
For further information, *write* Acme Mfg. Co., 1400 E. Nine Mile Rd., Detroit 20, Mich.

Milling Machine Has Three Part Hydraulic System

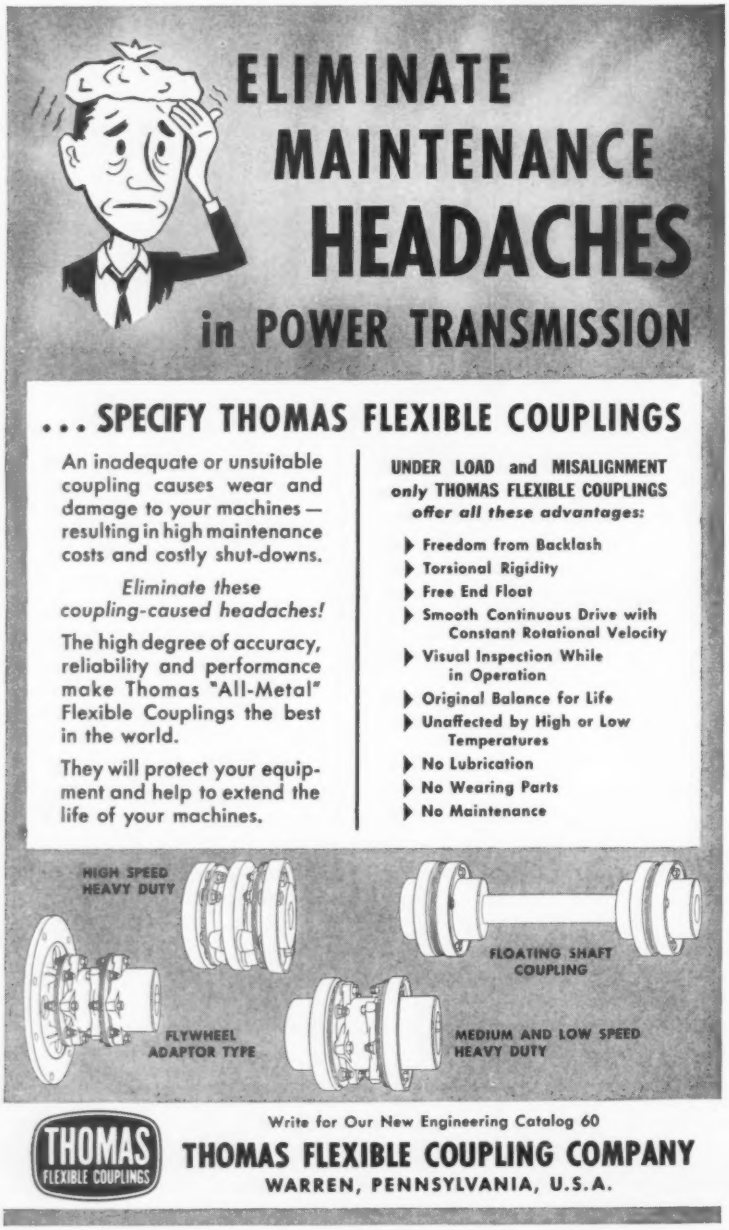
A MILLING machine with a hydraulic feed is designed for light duty production at low initial cost.

The unit (Model 624 Hydro-Mill) has an infinite table speed in both directions from 0 to 600 in. per minute. The table measures 6 x 24 in. and has 10 in. travel (4½ in. transverse travel).

The hydraulic system has three main parts and provides changeover on feeds in less than 1 minute. Other specifications: A 2⅞ in. rise and fall of spindle in any one set-



(*Please turn to Page* 132)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HEADACHES
in POWER TRANSMISSION
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An inadequate or unsuitable coupling causes wear and damage to your machines — resulting in high maintenance costs and costly shut-downs.
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The high degree of accuracy, reliability and performance make Thomas "All-Metal" Flexible Couplings the best in the world.
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UNDER LOAD and MISALIGNMENT only THOMAS FLEXIBLE COUPLINGS offer all these advantages:
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THOMAS FLEXIBLE COUPLINGS
THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.

in 1960...

LOOK TO

McKAY MCK MACHINE

FOR PROGRESS IN METAL PROCESSING

FOR EXAMPLE—McKay Pipe and Tube Mills are recognized to be the best conceived and finest constructed machines of their kind. On the next two pages H. Newton Walker, President of Walker Brothers, Conshohocken, Pa., gives a typical user reaction.

MCKAY

How McKay Tube Mills give Walker Brothers a competitive edge

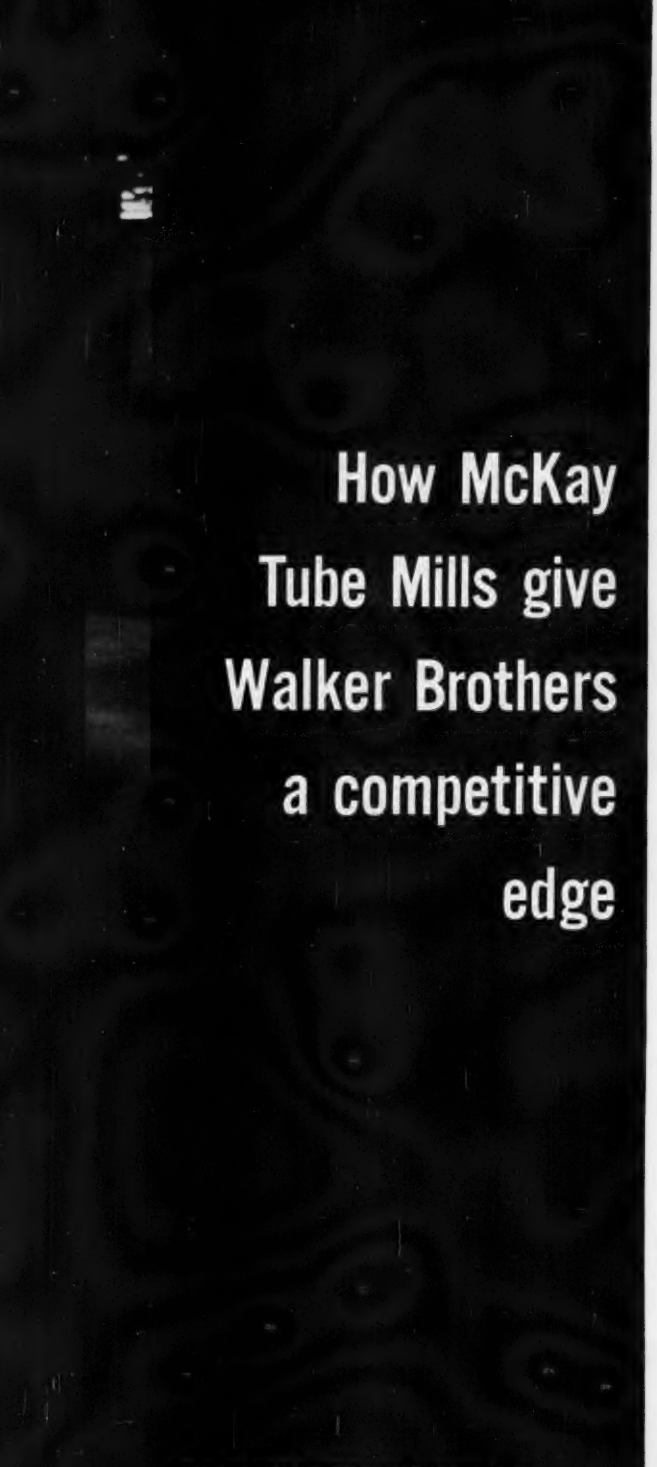


Photo by Arnold Newman shows H. Newton Walker, President of Walker Brothers, speaking with Walter A. Cubberley (R.), Vice President, Production, and McKay sales engineer, Edward M. Lyden, about the high quality product Walker's new McKay 5" Tube Mill is producing.

"Our new McKay 5" Tube Mill enables us to extend our production range to the larger sizes of Walkerduct and steel tubing. The mill affords close manufacturing tolerances and improved control over production schedules," says H. Newton Walker, President of Walker Brothers, Conshohocken, Pa.

High Quality Product—Walker Brothers has been a primary supplier of high quality electrical distribution materials to the commercial and industrial construction industry for fifty years. "Walker of Conshohocken" products include building wire, power and control cables, mechanical steel tubing, steel electrical metallic tubing, rigid steel conduit and underfloor raceways.

"This is the third McKay Tube Mill we have installed since 1951 to increase our capacity to manufacture conduit and raceways," continues Mr. Walker. "Each of these mills," he says, "has turned out a product consistent with our high standards of manufacture."

Better Production Economies—Walker Brothers has, in addition to the new McKay 5" Tube Mill, two 3"-capacity McKay mills equipped with strip looping and welding equipment. These mills are generally used to produce ½" through 2" thin wall conduit on a continuous basis at a speed of 150 feet per minute. The new 5" mill also operates at 150 F.P.M. and at that speed can easily produce Walker's line of 6.5" x 1.5" x .076" rectangular raceway.

Mr. Walter Cubberley, Vice President, Production, states: "We have been most satisfied with the performance of this equipment. Performance of the McKay mill has more than met our expectations regarding versatility and cost savings."

Low Maintenance Cost—"There's something to be said for the design of this equipment, too," he says, "in that maintenance is, and has been, satisfactorily low regardless of the age of the machinery."

"This is very solid equipment, including the welder. In fact, I would say these are the best mills we could have selected for our type of operation," Mr. Cubberley concludes.

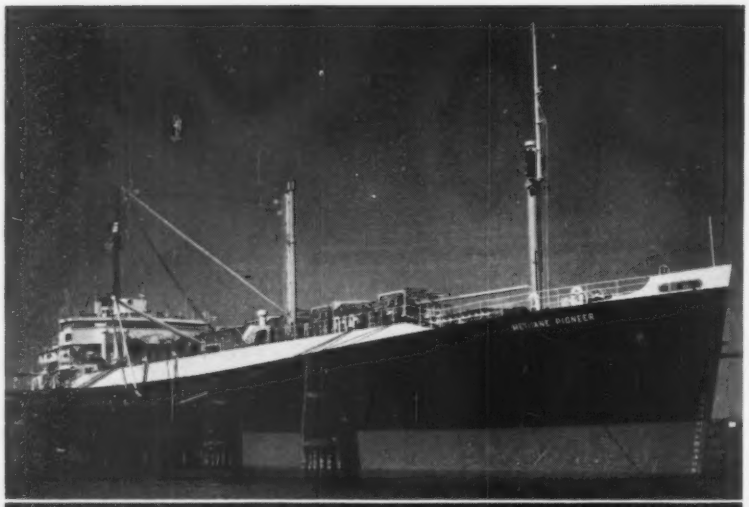
McKay Machine designs and builds electricweld tube mills for high speed production of ferrous and nonferrous welded tubing up to 20" in diameter. The experience of nearly 25 years of pioneering in the design of tube making equipment is behind each modern McKay Tube Mill.

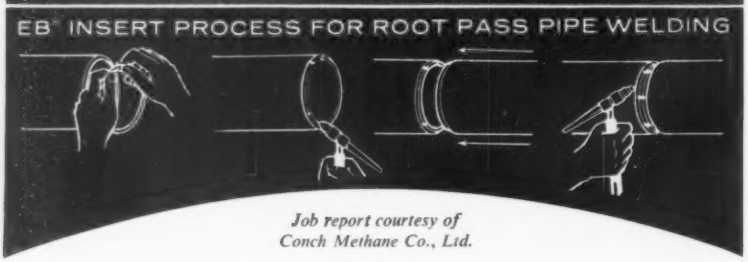
Write for literature, or send a description of your needs for prompt quotation to McKay Machine Company, Youngstown 1, Ohio.

LOOK TO

McKAY MCK MACHINE

FOR PROGRESS IN METAL PROCESSING





Job report courtesy of
Conch Methane Co., Ltd.

when pipe joints must be completely dependable at minus 258°F

The engineers who successfully "broke through" the problem of handling liquefied methane gas on and off the "METHANE PIONEER" at minus 258°F had to "play it safe" in every respect. To provide unquestionably *safe* stainless pipe joints, Arcos EB Consumable Weld Inserts were used to make the important root passes.

EB Inserts permit welding to be done from one side only. They eliminate back-up ring obstruction and produce a smooth inside contour to expedite gas flow. If you are not familiar with the advantages of EB Weld Insert for "tough" pipe joining problems, write ARCOS.

*Trademark of General Dynamics Corp.

WELD WITH ARCOS

EB* WELD INSERT

ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.

NEW PRODUCTS and equipment

(*Continued from Page* 128)

ting with production handle; 6 in. rise and fall with lead screw; four spindle speeds ranging 500 to 2050 rpm from a ¾ hp motor; 7 in. maximum from table to center of spindle.

For further information, *write* Northern Illinois Machinists, Crystal Lake Road, McHenry, Ill.

Pallets Can Be Set Up, Folded Without Tools

ALL STEEL, welded pallets for plant or warehouse material handling are available in standard or custom sizes.

Setting up or folding can be done by raising or lowering the corner posts in keyhole slots on the base plate. No small parts are used and

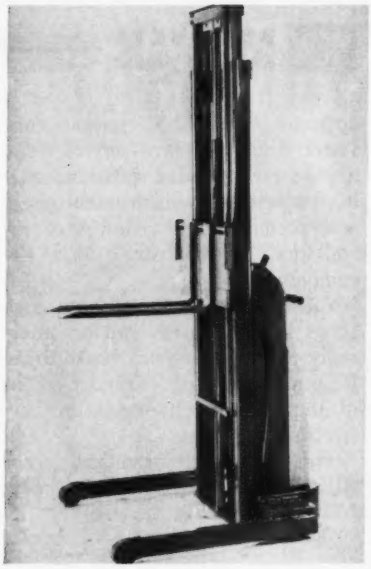
one man can set up or fold them without tools. Safety pockets welded to the base plate give rigid support when stacking.

For further information, *write* Palmer-Shile Co., 16025 Fullerton Ave., Detroit 27, Mich.

Portable Elevating Trucks Have Dual Floor Brakes

A LINE of battery powered portable elevating trucks comes in 24 models. Twelve models are rated for lifting 1500 lb loads (up to 32 in. long). The others have 2000 lb load capacities and 24 in. load lengths.

Design changes include heavier forks and hydraulic cylinders. Fea-



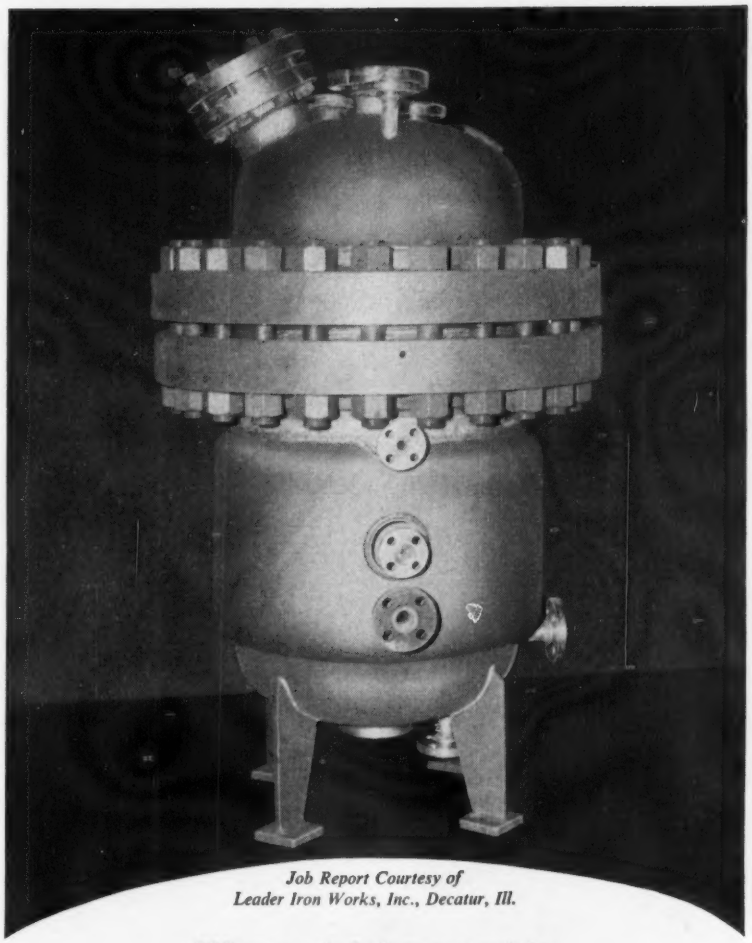
tured is a welded steel frame with alloyed steel construction in the lifting channels. Safety features include dual floor brakes and a built-in lowering valve in the hydraulic system to eliminate the danger of sudden or rapid lowering of a load. You can get a hydraulic drive attachment for moving 1500 lb capacity trucks and a wheel guard that stops the truck if the guard strikes the operator's foot or other obstruction.

For further information, *write* American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29, Pa.

Lift Trucks Available With Torque Converter

THREE lift trucks (Series F) in 3000, 4000, and 5000 lb capacities are powered by gasoline or liquefied petroleum gas engines developing 52 hp (maximum).

The models are available with standard transmission or with an



Job Report Courtesy of
Leader Iron Works, Inc., Decatur, Ill.

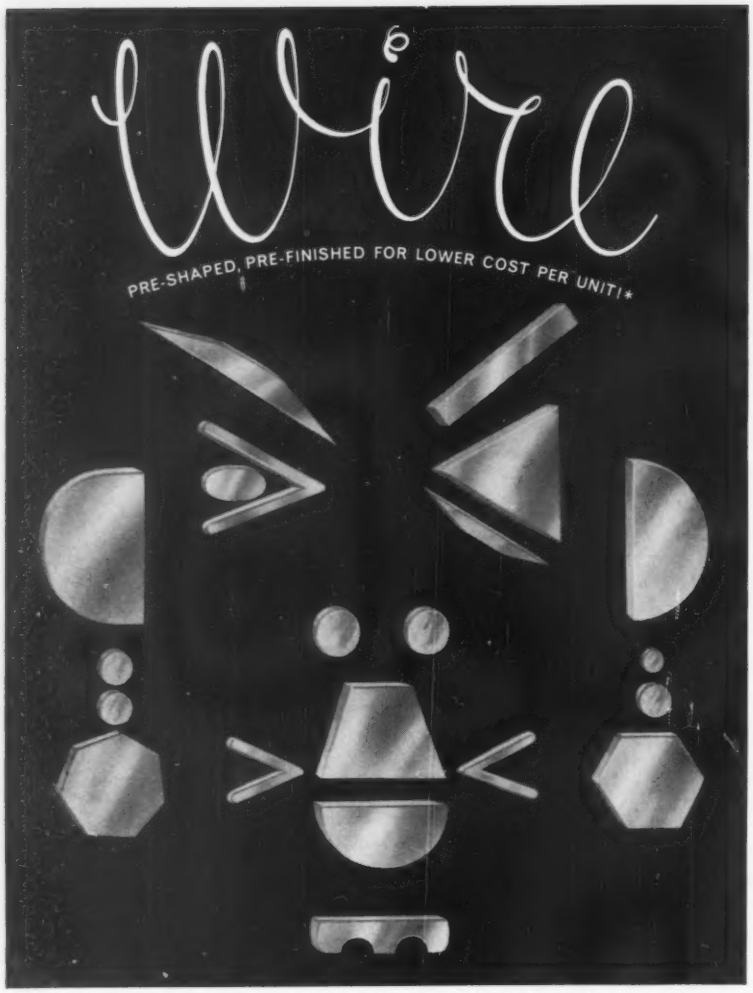
When stainless welds must also resist heat and pressure

This sturdy autoclave made of Type 316 stainless steel must operate under pressures up to 1000 psi at 600°F. Code specifications called for X-ray quality weld. To meet all these conditions for successful and long performance Arcos Chromend KMo (Type 316) electrodes were used for joint fabrication. When you use Arcos Stainless Electrodes you can always count on their providing multiple benefits.

WELD WITH ARCOS

STAINLESS ELECTRODES
for quality weld metal

ARCOS CORPORATION • 1500 South 50th St., Philadelphia 43, Pa.



*Examples shown are greatly enlarged cross-sectional views of selected standard and special shapes available

The right shape plus the right finish equals lower production costs

with CONTINENTAL® round and special shaped wire

Face up to the pleasant fact that you can often shave your production costs appreciably—and win extra sales—by choosing the right shape in wire. You save because you eliminate forging, stamping, rolling or machining operations. What's more, you can get these ready-made shapes (and many others than shown) in bright, galvanized, coppered, liquored, or tinned finishes that save further in polishing and plating. If you use low and medium low carbon steel wire in any shape, form or finish, by all means learn what Continental can offer you. We have solved literally thousands of problems involving wire. We'd love to have a shot at solving yours.

Write for free copy of our new wire manual

CONTINENTAL STEEL CORPORATION KOKOMO, INDIANA

PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE, Flame Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright and special shaped wire. Also Welded Wire Reinforcing and Galvanized Fabric, Nails, Continental Chain Link Fence, and other products.

NEW PRODUCTS and equipment

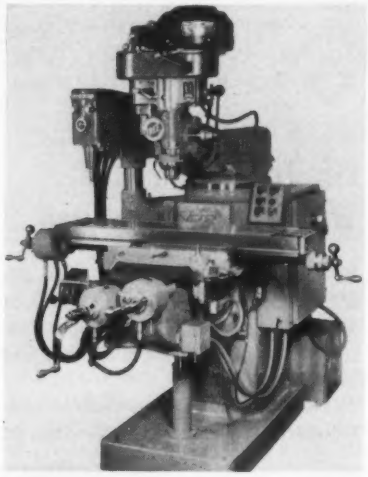
optional Power-Shift torque converter drive. To save service time, a plug arrangement splits the wiring harness at the instrument panel and permits quick removal or installation of the panel, says the company.

An emergency brake with two shoes is designed to expand internally to the emergency brake drum for positive holding. It's independent of the standard hydraulic braking system.

For further information, *write* Allis-Chalmers Mfg. Co., Box 512, Milwaukee 1, Wis.

Hydraulic Tracer Control Added to Milling Machines

A HYDRAULIC tracer control has been added to two milling machine models (2UVR and 2VG). The control (Scan-O-Matic) adds automatic, hydraulic, three dimensional scanning and profiling to the mills and maintains original ranges and capacities.



With the control system, the stylus follows the contour of the model operating a dual valve which co-ordinates the knee and table or knee and saddle motions. A constant rate of cutter feed is maintained over any surface from horizontal to vertical, according to the company.

For further information, *write* Tree Tool & Die Works, 1600 Junction Ave., Racine, Wis.

NEW Literature

Write directly to the company for a copy

Filler Metal Selection

A welding aid specifies correct filler alloys for all recommended wrought alloy parent metal combinations. Acceptable filler metal alloys are listed for each combination and are given A, B, C, or D ratings for ease of welding, strength of welded joint, corrosion resistance, service suitability at temperatures above 150° F, color match after anodizing, and ductility. Aluminum Co. of America, 743 Alcoa Bldg., Pittsburgh 19, Pa.

Cryogenic Gas Data

You can get data on the physical properties of cryogenic gases in both wallet size and full sheet size cards. Data on nitrogen trifluoride are supplied. Air Products Inc., Allentown, Pa.

Cleaning Wrought Aluminum

A bulletin describes a process that can clean wrought or extruded aluminum. The process removes microcorrosion and leaves a smooth, silvery appearance. It's used before painting, anodizing, and spot-welding or inert gas welding. Frederick Gumm Chemical Co., 538 Forest St., Kearny, N. J.

Screw Conveyor Drives

Bulletin 7106 describes screw conveyor drives and presents information about selection and dimensions. Dept. 255, Falk Corp., Box 492, Milwaukee 1, Wis.

Pipe Data Chart

A data chart (Sec. F, No. 7) covers the dimensions and weights of steel pipe. Fourteen different schedules are shown. Sizes range ⅛ in. P.S. to 30 in. P.S. Where the wall thickness specified for stainless pipe differs from carbon pipe, the data for stainless pipe are shown. Peter A. Frasse & Co. Inc, 17 Grand St., New York 13, N. Y.

Electron Beam Welding

A 12 page catalog describes electron beam welding. It discusses operation, advantages, and the equipment required. Included is a full page schematic drawing of an electron beam gun. Air Reduction Sales Co., 150 E. 42nd St., New York 17, N. Y., a division of Air Reduction Co. Inc.

Precise Solder Preforms

Technical data bulletin Z-103 lists compositions and melting points of 33 typical alloys available as preforms. The bulletin shows the various available shapes. They include discs, washers, spheres, squares, rectangles, and split rings. The alloy preforms cover a 360 to 700° F melting range. The 2-page bulletin also lists complete specifications on sizes and tolerances. Accurate Specialties Co. Inc., 36-11 57th St., Woodside 77, N. Y.

On production and maintenance work in manufacturing and service industries, Apex screwdriving tools have helped cut fastening costs for large and small companies alike. There's an Apex screwdriving tool to drive just about any kind and size of screw-type fastener . . . for use with any popular make of power or manual driver. All Apex Standard and Magnetic Screwdriving Tools are listed in Catalog 30-C; write, on your company letterhead please, for your copy.

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TOP PRIORITY FOR YOUR RUSH ORDERS . . . . .

RED CIRCLE SERVICE

Acme-Newport offers you *Red Circle Service* to meet the many demands for quick handling of spot requirements. Every copy of your rush order is plainly red circled to ensure preferential attention throughout the processing.

Red Circle Service represents an effective combination of good scheduling, modern facilities, personal attention to quality and service, and the flexibility of operation inherent in a mill of this size. It permits customers to exhaust old inventories without the hazard of delayed delivery of new tonnage.

This service already has proved itself to satisfied customers who are the very life blood of Acme-Newport. Use *Red Circle Service* to balance *your* inventories with early deliveries of flat rolled steel made to your exact specifications.

● RED CIRCLE SERVICE

PRODUCTS OF ACME-NEWPORT STEEL

Hot Rolled Steel in Coil
Hot Rolled Pickled Steel in Coil
Hot Rolled Sheets
Hot Rolled Pickled Sheets
Cold Rolled Steel in Coil (*full hard only*)
Cold Rolled Sheets
Alloy Sheets and Plates
Plates (5/16" *and lighter*)
Electrical Sheets
Electric Weld Line Pipe
Spiral Welded Pipe

Acme-Newport Steel COMPANY
NEWPORT, KENTUCKY
A SUBSIDIARY OF ACME STEEL COMPANY

Market to Hit Bottom in July

STEELMAKERS expect July to be their worst month by almost any yardstick—order entry, production, or shipments.

It won't be much worse than June, but inventory cutbacks, vacations, and automotive model changeovers are sure to slow the industry's pace—driving sales, output, and shipments to the lowest levels of the year.

AUGUST UPTURN—Hopes for an upturn in August are pegged on two assumptions: 1. Automakers will be ordering heavily for their 1961 model runs. 2. Other consumers will have completed their inventory adjustments. When the car companies come into the market, leadtimes will lengthen, and lesser buyers will have to protect themselves by raising their inventory objectives. Demand will tend to snowball.

LIQUIDATION CONTINUES— At some mills, orders are still declining; at others, they're relatively stable but far below the volume that might be expected when users are chewing up steel at a rate equivalent to 75 per cent of mill capacity. Most of the orders that are being booked are small ones, and many are marked "urgent," indicating that consumers have knocked their inventories down to minimum working size.

AUTOMAKERS DISAPPOINT— Although they're producing cars at a high rate and selling them at the fastest pace since 1955, automakers aren't releasing steel orders as rapidly as they were a few weeks ago. In Chicago, steelmakers have modest tonnages on their books for July and August, but their order backlogs aren't filling up as quickly as expected. It's believed that about one-fourth of the tonnage scheduled for July shipment is for 1960 models and three-fourths for next year's cars. In Pittsburgh, steel sales executives were surprised and disappointed when a leading automaker asked that part of a big July order be held for August delivery.

IMPORTS DROP SHARPLY— Latest figures released by the Business & Defense Services Administration show that 331,000 tons of foreign steel were landed at U. S. ports in April (vs. 464,000 tons in March, and 359,000 tons in April, 1959). Although the import total for the first four months was 55 per cent higher than it was in the corresponding period of 1959 (1.7 million tons vs. 1.1 million), market analysts are optimistic. Reason: It seems clear that first quarter imports were artificially high—reflecting commitments made by U. S. buyers when resumption of the strike against domestic mills appeared imminent. Industry economists are confident that the import total for 1960 won't be more than 4 million tons (vs. 4.4 million last year). They're hopeful that exports (235,000 tons in April) will balance imports within a few months.

TIN PLATE SHINES—Largely unaffected by the inventory recession, tin plate producers are operating at capacity. Although the can companies have held up some releases because of bad weather and big inventories held by some of their customers, tin mills are solidly booked for June and July. At least one firm is sold out for the balance of the year.

From a manufacturing standpoint, the second quarter has been as strong as the first. Third quarter operations will slip to about 85 per cent of capacity as the canning season passes its peak.

PRODUCTION STEADY— Last week, steelmaking operations were at 62.3 per cent of capacity, up 0.7 point from the previous week's revised rate. Production was about 1,775,000 ingot tons.

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*Current prices were published in the June 13 issue and will appear in subsequent issues.

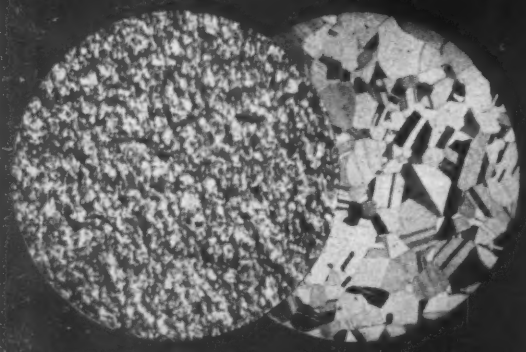
THESE SURFACE TRACES

prove that you can cut polishing costs with Formbrite, Anaconda's superfine-grain drawing brass.

STANDARD DRAWING BRASS

(grain size, .045 mm) – after 40% elongation

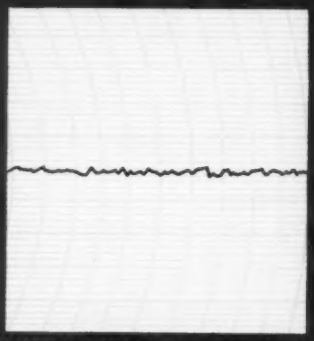
ENLARGED SURFACE TRACE showing the roughness that causes "orange-peel" effect in the working of standard drawing brass. Smoothing such mountains down to the valleys takes considerable cutting. For small deep-drawn products, up to five polishing wheels might be needed. Polishing compound costs run high; production rates, low. Bottlenecks hamstring operations.



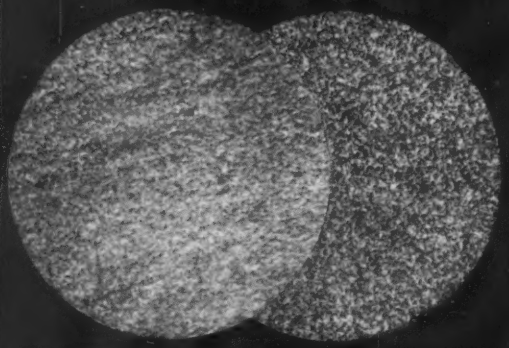
THE STRETCHED SAMPLE of standard drawing brass looks like this (left, above) when seen in oblique illumination and magnified 20x. Its microstructure is shown 75x at right. This is the kind of drawing brass that's been used for decades for stamped or drawn brass products and the micrographs show in another way why polishing costs have been high.

FORMBRITE DRAWING BRASS

(grain size, .005 mm) – after 40% elongation



ENLARGED SURFACE TRACE showing Formbrite's smoothness even after deformation, the test of polishing characteristics of a drawing brass. It is relatively easy to level these little hills on the surface of Formbrite. In many cases, users find they eliminate cutting operations altogether, need only a simple color buff. Finishing savings run up to 50%.



WHEN SEEN IN OBLIQUE ILLUMINATION and magnified 20x by the microscope, the stretched Formbrite surface looks like this (at left, above). Its microstructure is shown 75x at the right. This uniform superfine-grain structure is produced by special procedures of rolling and annealing developed by The American Brass Company.

FORMBRITE is springier, harder, more scratch resistant than the usual drawing brasses in the same standard tempers. Yet it retains remarkable ductility for forming and drawing—even such deep-drawn products as pen barrels. And Formbrite costs no more than ordinary drawing brass, despite its superiority. Get full details from your Anaconda representative or write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

6048

FORMBRITE®

Superfine-Grain Drawing Brass an

ANACONDA®

product made by The American Brass Company

Scoreboard on One-Coat Enameling Sheet

Company	Name of Product	Production Status
ARMCO STEEL CORP.	UNIVIT	Will be in commercial production in third quarter.
BETHLEHEM STEEL CO.	BETHNAMEL	Being produced in commercial quantities.
U. S. STEEL CORP.	(*)	Being produced in trial lots. Will produce in commercial quantities early in 1961.
YOUNGSTOWN SHEET & TUBE CO.	YO-NAMEL	Still in research stage. Will be available in commercial lots in 6 to 12 months.

*U. S. Steel has not named its product.

Steelmakers Market New Enameling Sheet

SOMETHING NEW is being added to the steel market. It's a one coat, direct on enameling sheet which producers feel will answer the needs of the appliance industry and others for a quicker, cheaper, method of applying porcelain enamel.

While only one of the four major producers is making the sheet in commercial quantities (see exhibit above), the other three will have it on the market around the turn of the year or earlier. Others are watching the market closely, and if it looks like a good thing, they say they will consider jumping in.

• **Market Potential** — Major users will be the appliance people, who, with steelmakers, have been experimenting with the new material for several years. Some architectural applications are possible, but tonnage will be small. Researchers at Westinghouse Electric Corp.'s Columbus, Ohio, plant are "high" on the possibilities, but like most others in the industry, they are not ready to make a sweeping change to the new material. Several reasons explain the caution:

First, supply is not yet sufficient to assure uninterrupted production. It's possible that some 1961 model appliances will utilize the sheet, but the changeover cannot be significant until steelmakers themselves make the switch.

Second, the switch will require equipment changes by both the steelmakers and appliance makers.

Third, a large amount of porcelain enameling is being done on regular cold rolled sheets, which cost less than enameling sheets. "Where cold rolled has proved satisfactory in the past, it will be difficult to convince a manufacturer that he should change to the new sheet," says John Oliver, managing director of the Porcelain Enamel Institute.

Fourth, the current market situation is not conducive to such sweeping changes.

• **Advantages** — But the one-coat sheet has several advantages. In the first place, it saves time and costs by eliminating a second coating and firing. Second, it is being priced at the same level as the two-coat type. Third, for applications which still would require a two-coat finish, such as architectural, the new sheet compares favorably with the two-coat type.

Market observers feel that the re-

duction in costs may help open new appliance markets for vitreous enameling which have been limited to paint because of moisture attack or heat sag. Example: Automatic washer cabinets.

• **History**—Direct-on enameling is not a new idea. For several years, Inland Steel Co. has produced a premium price, titanium alloy sheet, Ti-Namel. Several appliance producers have been experimenting with this sheet and finding special applications for it. The new one coat sheet, which has a low carbon conbon content and a regular, cold rolled sheet surface, has been under development for 15 years, say Armco Steel Corp. officials.

Producers claim that eventually the new sheet will completely replace the two-coat type. They also hope to recapture the market which has drifted over to plain, cold rolled sheets, but they admit the job will be difficult. "After all," admits one, "enameling sheet is still a premium product compared with ordinary cold rolled, and there are plenty of applications where cold rolled is perfectly satisfactory."

Sheets, Strip . . .

Sheet & Strip Prices, Pages 150 & 151

Consumers are chewing up more sheet tonnage than they are buying, encouraging the hope that inventories will soon be liquidated to the point new tonnage will have to be procured to support curtailed summer manufacturing schedules.

Consumption is holding up fairly well in such lines as stove production (makers operating around 80 per cent of capacity) and air conditioning equipment. The refrigeration equipment people and manufacturers of office furniture are also doing moderately well. Business in steel drums and other shipping containers, however, is lagging, and there is little pressure on the mills for shipments to the service centers.

In general, demand for flat rolled products is holding above that for the other major products, even though new business is in disappointing volume. Most orders are small, almost every buyer demanding quick deliveries, indicating ordering is hand to mouth.

Independent drum fabricators have drastically curtailed their sheet purchases. They can't sell drums profitably in competition with several large makers who recently cut unit prices by 50 cents.

A disappointing development: A major automaker requested that July sheet tonnage be held up for August delivery. The company had been expected to place substantial new business this month and next for late July and early August shipment. Now it appears it will prolong its 1960 model run, using steel already in stock and on order.

Automotive buyers, in general, are not specifying steel as fast as they were a couple weeks ago. Order backlogs for automotive account are not filling up as expected. There are modest tonnages on books for July and August delivery, about one-fourth of the orders being for 1960 models and three-fourths for the 1961 lines.

Hot rolled sheets are available within two to three weeks, and cold rolled within four to five. Galvanized sheets are available for July shipment. The galvanizers are operating at capacity and are expected to maintain that pace through July. Indications are,

EXECUTIVE REPORT #14

THEY STRETCH THE LIFE OF DRILLS

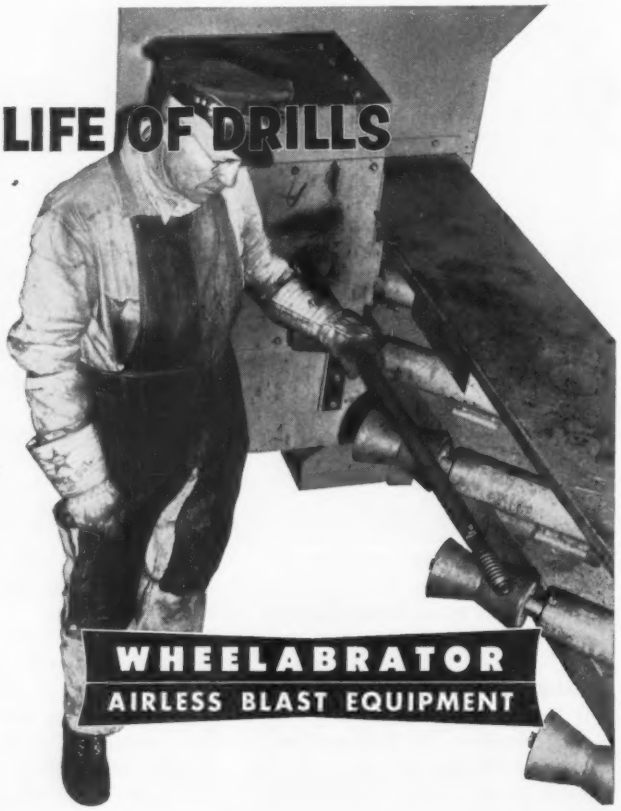
...with Wheelabrator® Shot Peening

Mining drills manufactured by the Gardner-Denver Co. last longer, dig deeper, with greatly increased resistance to fatigue failure imparted by Wheelabrator shot peening.

Passing through the Wheelabrator shot peening cabinet, the hollow steel drills take on favorable stresses that increase their service life many times. A plus benefit obtained is that heat treat scale is completely removed at the same time.

Life increases up to 1000% frequently achieved through Wheelabrator Shot Peening

Fatigue strength of gears, springs, and a wide range of other highly stressed steel parts can be increased substantially in Wheelabrator shot peening equipment. For engineering consultation write to Wheelabrator Corp., 509 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ont.



though, that the big demand for their product has peaked for the time being.

Tool Steel . . .

Tool Steel Prices, Page 153

Shipments of tool steels (excluding hollow drill steel) in April totaled 8098 net tons, down sharply from the 10,362 tons moved in March, and the 11,621 tons shipped in April, 1959, reports the American Iron & Steel Institute.

The total movement in the first four months of this year was 38,307 net tons, up 1982 tons from the 36,325 moved in the like period of 1959.

Import Steel Prices Hold Though Demand Is Slower

Though demand for foreign steel continues to ease, prices on the major products from Western Europe remain unchanged, except for a decline on wire rods. Prices on Thomas commercial No. 5 rods are off $1 to $2 at Great Lakes, South Atlantic, and Gulf ports, and on open hearth No. 5 rods, $4 to $6, depending on the general area, but affecting all ports to some degree, including those on the North Atlantic and West Coasts.

Deliveries on most products range six to eight weeks, ex-mill plus a minimum of three weeks for shipment to this side. Broadly, this represents some easing in schedules, as domestic European demand (as well as demand in this country) has softened—especially on bars, plates, and wire products. Exceptions include cold drawn tubing, forgings, and machine parts, which are still in strong demand abroad, with European mills oversold.

Italian steel continues to move into the Buffalo area for use in the Niagara power project. It is underselling locally produced steel. A shipment of 300 tons arrived at the Buffalo Port terminal June 8.

Additional evidence of the potential market for steel in Alaska is provided by current imports of steel pipe for the Anchorage-Kenai Peninsula gas pipeline. Construction, expected to start in July, is being handled by Delta Engineering Co., agent for Anchorage Natural Gas Corp. The first shipment of 500,000 ft of 12 in. pipe arrived last month on a Danish motorship. It was purchased from Stewart & Lloyd, Glasgow, Scotland. The second consignment of 240,000 ft arrived June 7 on a German vessel. Some small diameter pipe came from Japan.

Because of the all-water haul, foreign steelmakers can undersell U. S. mills in Alaska.

Steel Bars . . .

Bar Prices, Page 140

Wisconsin Steel Div., International Harvester Co., Chicago, plans to close nearly all its facilities for seven and possibly ten days beginning the July 4 weekend. The shutdown is due to lack of orders. The mill produces bar steel; its volume is about evenly split between other company divisions and outside customers.

Because business is coming in so slowly, barmakers frequently bunch orders to get economical rollings. At leading mills, June operations are down substantially from last month's and probably won't exceed 50 per cent of capacity. Because of vaca-

EXECUTIVE REPORT #17

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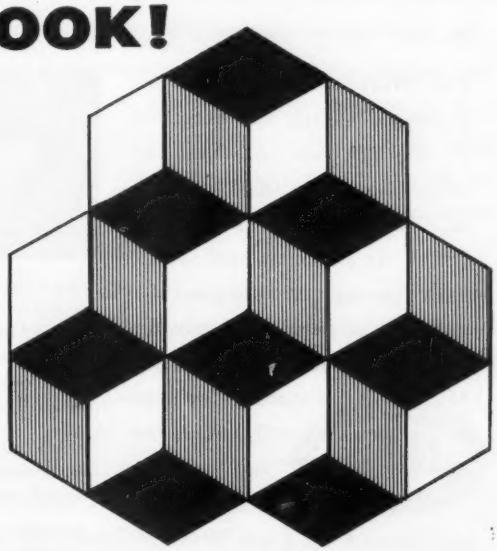
Count the cubes in the figure. You'll see six or seven, depending upon your point of view. Consider the total value of your present abrasive, and compare it with the proven value of Wheelabrator Steel Shot. Not just in price, but in abrasive consumption, cleaning speed, cleaning quality, and equipment maintenance costs as well. From any point of view, the proven quality of Wheelabrator Steel Shot adds up to extra value and extra profit.

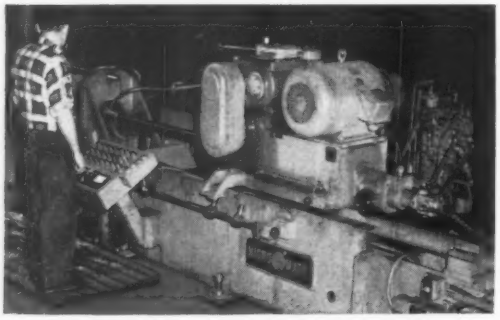


Write today for this new handbook of blast cleaning abrasive performance. It's full of charts and facts you can use to help cut abrasive consumption, reduce cleaning costs. Write to Wheelabrator Corp., 509 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ont.

WHEELABRATOR
STEEL ABRASIVES

WHY MICROHONING* OF HARDENED LINERS cuts production time two-thirds

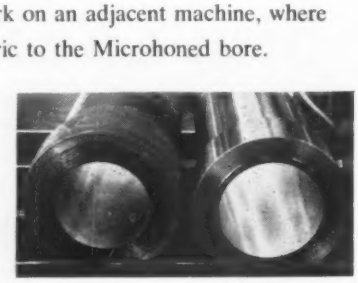
One of the largest steel corporations utilizes Microhoning's rapid stock-removal in the processing of oil well slush pump liners. Bore diameters ranging from 4.50″ to 7.75″ and up to 28″ long are lined with a special alloy steel hardened to 64-66 Rockwell "C". Over one cubic inch of stock per minute is removed from bores of these liners to reduce required production time by two-thirds.



This heavy-duty Hydrohoner has a 4-foot hydraulic head stroke, an 8-speed transmission, a special heavy-duty feed mechanism and automatic stonewear compensation.

One heavy-duty horizontal Hydrohoner has eliminated the use of bore grinding (two grinders), and replaced two old vertical honing machines. Requiring only one operator, the Hydrohoner does the complete bore machining operation in one-third the previous time. Also, during the automatic rough-Microhoning cycle, the operator is free for an average of 20 minutes to work on an adjacent machine, where the liner O.D. is machined concentric to the Microhoned bore.

Two Microhoning operations are performed (rough and finish) to provide final bore roundness and straightness within .0005″ and surface finish of 6-8 microinches (rms). An extremely hard surface having geometric accuracy and controlled finish lasts longer, provides better performance – that's why Microhoning is specified for processing these oil well slush pump liners.



Shown are rough-Microhoned and finish-Microhoned bores. Following each Microhoning operation every bore is given a close inspection under the revealing probe of a fluorescent light to insure a flawless surface.

See facing page for details on how Microhoning of pump liner bores secured production time savings.

**Registered U.S. Pat. Off.*

MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

tions in customers' plants, production will remain at a low level through July.

Finished Steel Shipments In April Show Decline

Mill shipments of finished steel products during April amounted to 6,741,809 net tons vs. 7,965,881 in March, reports the American Iron & Steel Institute. The movement in the first four months was 30.7 million tons, a total exceeded only by the 31.1 million tons moved in the like 1956 period. In the first four months of last year, 29.5 million tons were shipped.

Products shipped in largest amounts during April included: Cold rolled sheets (1,379,184 tons); hot rolled sheets (796,057 tons); and hot rolled bars, including light shapes (679,380 tons).

Principal market classifications receiving shipments during the month were: Warehouses and distributors (1,230,779 tons); automotive (1,176,833 tons); construction, including maintenance (936,954 tons).

Rails, Cars . . .

Track Material Prices, Page 152

Railroad steel business continues spotty. Freight cars under contract by carbuilders are taking fair amounts of light plates and shapes.

Recent awards include eight double-deck cab control and 32 double-deck trailer suburban coaches for the Chicago, Milwaukee, St. Paul & Pacific Railroad.

Tin Plate . . .

Tin Plate Prices, Page 151

While the tin mills are operating at a good clip, Midwestern market observers say there are indications that this year's requirements won't lump as large as had been expected.

Wire . . .

Wire Prices, Pages 151 & 152

Producers of wire and wire products report little improvement in demand, and the outlook for a pick-up over coming weeks is not promising with vacation suspensions at manufacturing plants just ahead.

Merchant wire is available for delivery from stock on most items, while shipments of manufacturers wire can be had within 30 days.

Reflecting the depressed state of demand, mill shipments of wire and

wire products in the first four months this year totaled 1,199,186 net tons vs. 1,312,007 tons in the like period last year.

Record Steel Output Expected in Britain

British steel production will reach a record 24 million tons this year, reports Edward Senior, commercial director, British Iron & Steel Federation. (He's in New York with the British Exhibition.) This year's total will compare with 20 million tons in 1959 and 22 million (the record) in 1957.

British steel capacity is reported at 25 million tons annually. An increase to 32.5 million tons is projected over the next five years.

The United Kingdom exports about 16 per cent of its iron and steel products. It imports about 5 per cent of its requirements. Last year, the U. S. Department of Commerce records show the United Kingdom shipped 252,667 net tons of steel to this country; the largest single item (pipe and tubing) amounted to 77,924 tons.

The U.K. was the sixth largest exporter of iron and steel to this country in 1959. The largest was Belgium - Luxembourg, which shipped us 1,466,431 tons.

Great Britain has coke, but it must import about 50 per cent of its iron ore.

Distributors . . .

Prices, Page 154

Service centers look for a further dip in orders this month and a still further decline in July. Many users are reducing inventories and will consume smaller tonnages during the vacation season.

The unexpected rapidity with which the mills executed accumulated orders early this year is reflected in slow sales and smaller purchases. By early fall, current conditions are expected to show marked improvement.

Tubular Goods . . .

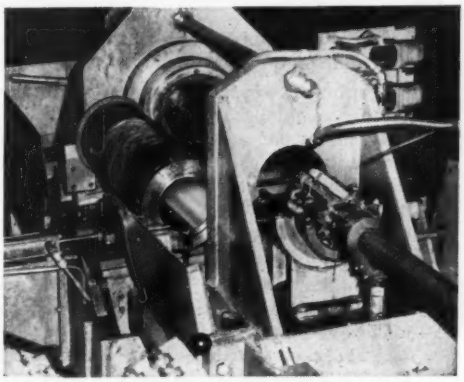
Tubular Goods, Prices, Page 153

There has been no appreciable pickup in demand for standard pipe. Producers say there's a lot of construction work—schools and federal projects—on the boards, but they think that only a small part of it

HOW MICROHONING OF HARDENED LINERS cuts production time two-thirds

Microhoning eliminates bore grinding (two grinders), replaces two old vertical honing machines with one horizontal Hydrohoner, and performs all bore machining on this one Hydrohoner in one-third of the previous processing time. Here's how these unusual production results are obtained on oil well slush pump liners.

Two Microhoning operations (rough and finish) are performed on the bores of these hardened (64-66 Rockwell "C") liners. Bore diameters range from 4.50" to 7.75" and lengths are up to 28". The rough Microhoning removes approximately .090" of stock at an average clip of .0045" per minute and generates a 20 microinch (rms) finish.



Fixturing includes hydraulic end clamping to handle liners from 14" to 28" long. Adjustable hydraulic loader handles varying diameters. Heavy-duty Micromold tooling allows the use of more abrasive for faster stock removal. One tool handles a range of bore diameters.

A new stonefeed assembly, capable of exerting a five-ton thrust, permits this stock-removal performance. When the Microhoning tool enters the bore, the abrasives are instantly expanded against the bore surface. As contact is made, a sensing device de-energizes the rapid feed and a pre-set regular feed rate controls further expansion. At the end of the automatically timed Microhoning cycle, the tool is instantly collapsed and withdraws from the bore.

Changeover from rough to finish Microhoning requires only the replacing of abrasives with finer-grit sticks and resetting of timer to shorter cycle—less than 90 seconds is needed for changeover. Finish Microhoning time is about two minutes, roundness and straightness are held within .0005" variation throughout the length of bore, and surface finish of 6-8 microinches (rms) is generated.

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Jack Graham ought to know. As a member of Du Pont's special Technical Service Group, he's seen his recommendations pay off in terms of long-range cost reductions and job satisfaction for a variety of clients. Says Jack:

"Profit dollars are hard to come by. That's *one* reason Du Pont's systems of maintenance painting can be so important to *your* operation. We help you turn maintenance dollars into profit dollars. For instance, at a normal profit margin of 5%, $50,000 in savings—made possible by top-quality Du Pont finishes and technical assistance—is equivalent to the profit on an extra $1,000,000 of sales!

"Naturally, to realize maximum return on your maintenance dollar, quality paints are a *must*. Too many maintenance men have discovered, belatedly, that initial purchase price is an inaccurate determinant of value. Equally important are such factors as applied cost and job life. Which brings us to *another* reason why Du Pont paints are so often specified.

"You see, we spend enough time in your plant, examining equipment and conferring with maintenance personnel, to get a thorough understanding of your particular problem. Then we help you develop a step-by-step program geared to achieve maximum protection against every corrosive condition—*at lowest cost per square foot per year.*"

If you have a maintenance problem you'd like to talk over with an expert, there's a man like Jack Graham—skilled, experienced, a "pro" in his field—ready to serve you. Just call your local Du Pont district sales office. Or write: E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Dept. S-66, Wilmington 98, Delaware.

* * *

Trained as a chemical engineer, J. A. Graham joined Du Pont 15 years ago. Since then, he's devoted his time and talents to becoming a specialist in the field of industrial maintenance painting. In Detroit, Cleveland, Los Angeles and Philadelphia, he's helped solve problems of paint maintenance for the automotive, aircraft, steel, petroleum and marine industries. Now Eastern District Manager, Industrial Maintenance Sales, Jack is a member of the Corrosion Engineers Society.

DU PONT PAINTS

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

will be started during the summer months.

Pipe distributors' inventories are still large despite their determined efforts to liquidate surplus stocks. Hungry for business, they're selling small quantities and delivering at prices barely above the mill level. Result: Mills are getting little direct-consumer business.

Gas companies are offering the pipe producers little encouragement. All the lines they intend to install this year will be completed with 10 to 36 in. pipe that was purchased in 1959.

Active rotary oil drilling rigs in the week ended June 6 totaled 1982 vs. 1932 at the end of the preceding week and 2394 at the end of the corresponding week a year ago.

Steel Production Down In May, First 5 Months

Production of ingots and steel for castings in May was 8,832,000 net tons, bringing the total for the first five months to 53,350,750 tons, reports the American Iron & Steel Institute. Comparisons: In April, output was 9,777,857 tons. During the five months last year, a record 53,370,569 tons were produced.

The institute's index of steelmaking in May was 124.2 (1947-49 equals 100). It compared with 142 in April. The index for the first five months this year was 152.9 vs. 154 in the same period last year.

Based on the Jan. 1 capacity rating of 148,570,970 net tons of raw steel annually, steelmaking operations averaged 70 per cent in May vs. 80.1 per cent in April. The average for the first five months was 86.2 per cent.

Pig Iron . . .

Pig Iron Prices, Page 154

Movement of pig iron is expected to remain slow during the next few weeks. Many foundries start closing for vacations late this month and suspensions in July will be even heavier.

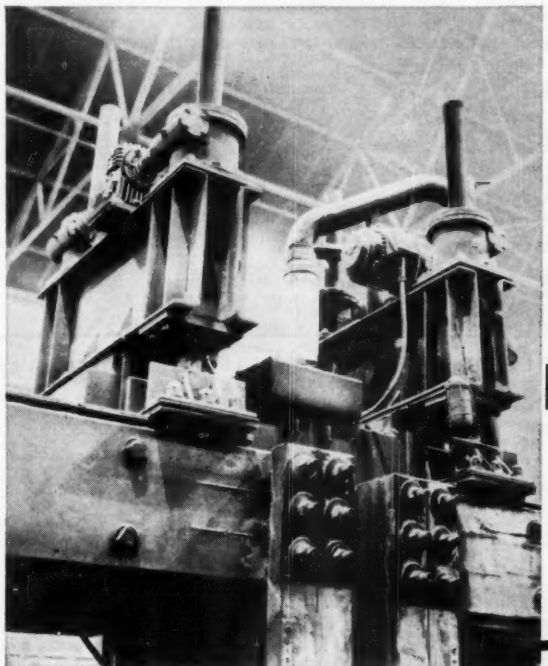
Shop shutdowns and hot weather will emphasize an already discouraging situation for merchant iron sellers: Consumption of iron in relation to scrap continues to decline as a result of new melting practices.

The Buffalo area is one bright spot for producers. Sellers there are busy as a result of demand from the New England and Midwestern districts. Iron has been moving west on the Great Lakes and is scheduled to move east on the barge

Steel Ingot Production—May, 1960

Period	OPEN HEARTH (Net tons)	BESSEMER (Net tons)	OXYGEN PROCESS (Net tons)	ELECTRIC (Net tons)	TOTAL (Net tons)	Percentage of capacity
1960						
January	10,510,616	211,132	280,981	1,046,675	12,049,404	95.5
February ...	9,715,527	215,263	245,458	949,558	11,126,806	94.3
March	10,103,122	202,812	306,741	952,008	11,564,683	91.6
1st Qtr. ...	30,329,265	630,207	833,180	2,948,241	34,740,893	93.8
*April	8,603,306	105,336	302,763	766,452	9,777,857	80.1
†May	7,844,000	73,000	310,000	605,000	8,832,000	70.0
1959						
January ...	8,280,985	120,005	186,820	729,575	9,317,385	74.3
February ...	8,541,031	128,515	176,970	756,422	9,602,938	84.8
March	10,216,474	184,892	236,595	929,784	11,567,745	92.3
1st Qtr. ...	27,038,490	433,412	600,385	2,415,781	30,488,068	83.8
April	9,884,322	195,730	237,018	964,850	11,281,920	93.0
May	10,117,968	200,887	257,325	1,024,401	11,600,581	92.5
June	9,521,053	185,794	259,731	941,056	10,907,634	89.9
2nd Qtr. ...	29,523,343	582,411	754,074	2,930,307	33,790,135	91.8
1st 6 Mo. ..	56,561,833	1,015,823	1,354,459	5,346,088	64,278,203	87.8
July	4,541,741	66,433	98,634	525,368	5,232,176	41.7
August	1,171,342	.....	.....	267,935	1,439,277	11.5
September ..	1,249,398	.....	.....	285,619	1,535,017	12.7
3rd Qtr. ...	6,962,481	66,433	98,634	1,078,922	8,206,470	22.1
9 Mo.	63,524,314	1,082,256	1,453,093	6,425,010	72,484,673	65.6
October	1,385,490	.....	.....	319,043	1,704,533	13.6
November ..	6,290,659	92,361	129,794	754,793	7,267,607	59.9
December ..	10,468,534	205,666	281,451	1,033,668	11,989,319	95.6
4th Qtr. ...	18,144,683	298,027	411,245	2,107,504	20,961,459	56.3
2nd 6 Mo. ..	25,107,164	364,460	509,879	3,186,426	29,167,929	39.2
Totals	81,668,997	1,380,283	1,864,338	8,532,514	93,446,132	63.3

Note—The percentages are based on annual capacities as of Jan. 1, 1960: Open hearth, 126,621,630 net tons; bessemer, 3,396,000 net tons; basic oxygen process, 4,157,400 net tons; electric and crucible, 14,395,940 net tons. Total: 148,570,970 net tons. In 1959, the capacity tonnages were: Open hearth, 126,528,380 net tons; bessemer, 3,577,000 net tons; basic oxygen process, 4,033,160 net tons; electric and crucible, 13,495,130 net tons. Total: 147,633,670 net tons.
†Preliminary. *Revised.



100 million pounds per year

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Versatile Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

CONE-DRIVE GEARS

DIVISION MICHIGAN TOOL CO.
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canal for delivery to New England consumers.

New England consumers will have higher pig iron costs in the second half unless foreign iron becomes more competitive with Troy, N. Y., and Buffalo iron reshipped from Beacon, N. Y., and equalized with the former producing furnace. The cost rise may amount to $3 or $5 a ton. Most Mystic iron at Everett, Mass., has been distributed from stockpile, but it remains a price basing point.

Blast furnace operations continue to slip. In the Chicago district, only 27 of 43 furnaces are active. This is the lowest number active since August, 1958, except for last year's steel strike period. Inland Steel Co. blew out its No. 2 stack at Indiana Harbor, Ind., June 7. Wisconsin Steel Div., International Harvester Co., plans to close nearly all its facilities for seven and possibly ten days beginning July 4 weekend. One blast furnace will be operated during that period.

Iron Ore . . .

Iron Ore Prices, Page 155

Because of sluggish steelmaking operations and curtailed consumption of iron ore, vessel operations on the Great Lakes are being cut back. Pittsburgh Steamship Div., U. S. Steel Corp., is laying up 13 vessels in its active fleet of 53. In all, 17 of the division's ships are idle. Four of its old, small carriers have not been operated the last couple of years.

Lake Superior iron ore shipments in the 1960 shipping season to June 1 totaled 18,162,255 gross tons vs. 15,745,231 in the like period a year ago. Stocks of Lake Superior ore at the beginning of May totaled 14,542,255 tons (U. S. ore) and 702,352 tons (Canadian ore). Total stocks from all sources amounted to 38,504,036 tons vs. 37,696,439 a year ago.

Iron Ore Statistics—April, 1960

Stocks of Iron Ore at Furnaces and Docks—April, 1960
(Gross tons)

	——U. S. Iron Ores——		——Canadian Ores——		Foreign	Total
	L. Superior	Other	L. Superior	Other	Ores	Tonnage
At U. S. Furnaces:						
Start of month	13,897,290	3,636,180	759,261	3,105,881	13,595,144	34,993,756
End of month at Massachusetts, New York	1,012,482	41,140	15,987	27,565	297,397	1,394,571
Pennsylvania	3,301,019	306,553	26,227	194,995	5,885,543	9,714,337
Maryland, Virginia, W. Virginia	58,015	10,253	10,270	1,009,513	2,663,586	3,752,087
Kentucky, Tennessee, Texas	168,447	296,713	.....	133,840	133,180	732,180
Alabama	871	1,846,670	.....	129,208	3,356,034	5,332,783
Ohio	2,447,407	39,087	317,167	1,101,070	771,364	4,676,095
Indiana	2,659,822	316	95,046	.....	37,154	2,792,338
Illinois	1,440,327	15,116	8,028	.....	181,406	1,644,877
Michigan, Minnesota	1,281,291	.....	40,962	.....	155,126	1,478,009
Colorado, Utah, California	.....	1,088,223	.....	.....	35,837	1,124,060
Undistributed	518	2,877	.....	.....	505	3,900
End of month	12,370,829	3,646,948	514,137	2,596,191	13,517,132	32,645,237
At U. S. Docks	1,384,719	.....	68,540	1,081,683	2,163,787	4,698,729
Total U. S.	13,755,548	3,646,948	582,677	3,677,874	15,680,919	37,343,966
Canada Furnaces:						
Start of Month	843,062	.....	146,991	373,985	14,700	1,378,738
End of Month	786,707	.....	119,675	248,622	5,066	1,160,070
U. S. & Canada	14,542,255	3,646,948	702,352	3,926,496	15,685,985	38,504,036

Consumption of Iron Ore in U. S. & Canada—April, 1960
(Gross tons)

	——U. S. Ores——		——Canadian Ores——		Foreign	Total
In U. S.	L. Superior	Other	L. Superior	Other	Ores	Tonnage
Massachusetts, New York	540,337	76,469	13,962	58,046	63,529	752,343
Pennsylvania	1,084,846	244,325	1,033	139,434	1,077,897	2,547,535
Maryland, Virginia, W. Virginia	62,482	37,512	9,053	274,076	554,969	938,092
Kentucky, Tennessee, Texas	45,500	88,253	.....	52,680	61,976	248,409
Alabama	.....	417,433	.....	.....	192,274	609,707
Ohio	1,053,549	72,821	91,817	387,251	290,703	1,896,141
Indiana	1,204,137	1,548	109,317	.....	72,211	1,387,213
Illinois	727,457	26,250	5,940	.....	83,465	843,112
Michigan, Minnesota	513,937	.....	44,113	64,209	47,742	670,001
Colorado, Utah, Calif.	.....	530,835	.....	.....	9,161	539,996
Undistributed	76	182	.....	.....	8	266
In U. S.						
Blast furnaces	3,458,756	910,807	205,679	589,696	836,047	6,000,985
Steel furnaces	90,105	58,105	4,322	685	633,776	786,993
Sintering plants	1,682,864	526,692	65,234	385,230	984,106	3,644,126
Miscellaneous	596	24	.....	85	6	711
Total U. S.	5,232,321	1,495,628	275,235	975,696	2,453,935	10,432,815
In Canada						
Blast furnaces	178,733	.....	95,247	171,416	.....	445,396
Steel furnaces	2,325	.....	.....	20,462	9,634	32,421
Sintering	63,526	.....	25,244	30,118	.....	118,888
Total Canada	244,584	.....	120,491	221,996	9,634	596,705
Total U. S. & Canada	5,476,905	1,495,628	395,726	1,197,692	2,463,569	11,029,520

Data from American Iron Ore Association.

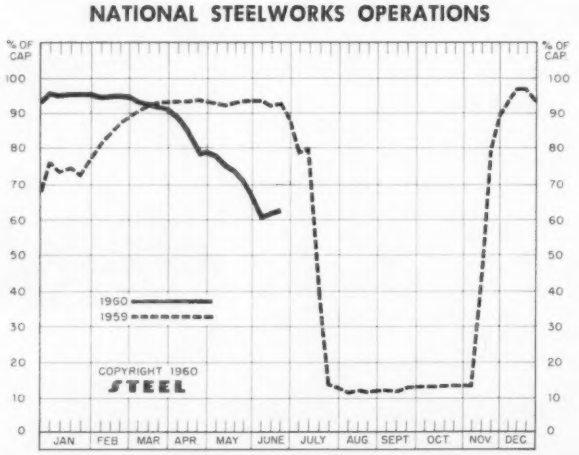
DISTRICT INGOT RATES

(Percentage of capacity utilized)

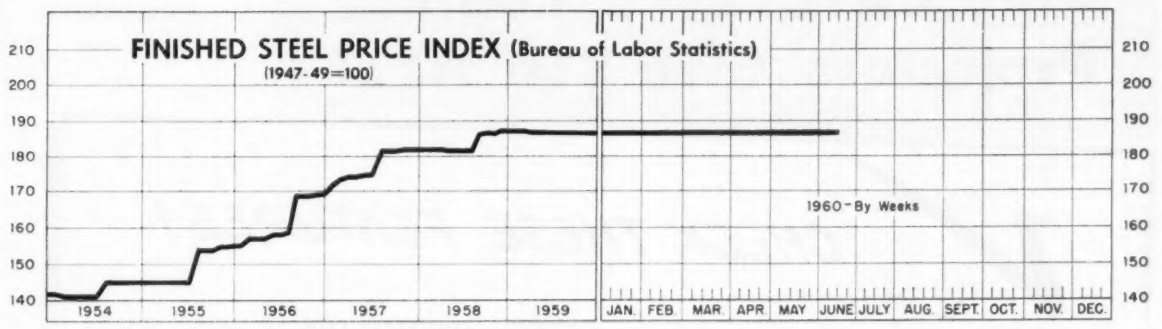
	Week Ended June 19	Week Ago	Month Ago	Year Ago
Northeastern	69	65	76	99
Buffalo	58	61	74	96
Pittsburgh	60	61	72	97
Youngstown	40	39	46	85
Cleveland	69	67	75	94
Detroit	80	79	93	97
Chicago	63	64	73	93
Cincinnati	64	64	82	82
St. Louis	77	77	83	91
Southern	67	62	72	88
Western	68	69	73	89
Total Industry	62.3	61.6	71.3	92.5
Index (1947-49=100)	110.5	109.3	126.4	163.1
Net Tons (In thousands)	1,775	1,756	2,031	2,620

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



June 14, 1960	Week Ago	Month Ago	May Index	Year Ago
186.6	186.6*	186.8	186.8	186.7

*Revised.

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended June 14

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloy, High Speed, W18 Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.385
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.765
Sheets, C.R., Stainless, 302 (lb)	0.658
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.489
Strip, C.R., Stainless, 430 (lb)	0.480
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.905
Pipe, Galv., Buttweld (100 ft)	23.585
Pipe, Line (100 ft)	199.533
Casing, Oil Well, Carbon (100 ft)	201.080
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	205.608
Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (bundles)	7.647
Nails, Wire, 8d Common	9.433
Wire, Barbed (80-rod spool)	8.414
Woven Wire Fence (20-rod roll)	20.003

STEEL's FINISHED PRICE INDEX*

	June 15 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	194.53
Index in cents per lb	6.713	6.713	6.713	6.713	5.270

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$118.45
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	56.54
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	56.04
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	57.27
Steelmaking Scrap, GT	31.33	31.33	33.33	36.50	35.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	June 15 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.30
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.30
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.55
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.40
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.25
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.25
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.77	4.53
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.225
Plates, Chicago	5.30	5.30	5.30	5.30	4.225
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.225
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.225
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.225
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.10
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.45
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	5.75
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	5.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	5.90
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	5.75
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	6.85
Tin plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.05

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$78.00
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	6.40	6.40	6.40	6.40	4.675

PIG IRON, Gross Ton	June 15 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$57.00
Basic, Valley	66.00	66.00	66.00	66.00	56.00
Basic, deld., Philadelphia	70.41	70.41	70.41	70.41	59.66
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.91	56.16
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	52.88
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	60.58
Malleable, Valley	66.50	66.50	66.50	66.50	56.50
Malleable, Chicago	66.50	66.50	66.50	66.50	56.50
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$30.50	$30.50	$33.50	$36.50	$34.50
No. 1 Heavy Melt, E. Pa.	34.00	34.00	35.00	38.00	36.50
No. 1 Heavy Melt, Chicago	29.50	29.50	31.50	35.00	34.00
No. 1 Heavy Melt, Valley	32.50	32.50	34.50	39.50	34.50
No. 1 Heavy Melt, Cleve.	31.50	31.50	31.50	36.50	31.50
No. 1 Heavy Melt, Buffalo	30.50	30.50	30.50	33.50	29.50
Rails, Rerolling, Chicago	49.50	49.50	52.50	58.50	51.50
No. 1 Cast, Chicago	42.50	42.50	42.50	50.50	41.50

COKE, Net Ton					
Beehive, Furn., Connisvl.	$15.00	$15.00	$15.00	$15.00	$13.75
Beehive, Fdry., Connisvl.	18.25	18.25	18.25	18.25	16.75
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	25.25

Only EX-CELL-O Contour Projectors* Give You ALL!

✓ CHECK THESE FEATURES!

☐ **LARGEST WORK AREA**—Constant eight inches of work space from lens to focal plane regardless of magnification. Plenty of room for large objects.

☐ **UNSURPASSED ACCURACY**—Famed Kodak Ektar® lenses guarantee reliable measurements with clear *accurate* images over entire screen.

☐ **BRILLIANT SURFACE ILLUMINATION**—Original design, "direct-on" built-in surface illuminator gives extra bright image and *full work clearance* at all magnifications.

☐ **ERECT—UNREVERSED IMAGE**—Correct, normal appearing images at all magnifications, eliminate confusion, simplify operation and save time.

☐ **COATED LENSES AND MIRRORS**—Produce clear sharp images characteristic of Ex-Cell-O Contour Projectors. Have been standard on all models for many years.

☐ **BRIGHT, GLARE-FREE SCREEN**—The "Fresnel" lens is exclusive with Ex-Cell-O, permits operator to see entire screen evenly illuminated from normal position. No "hot spots".

☐ **TRUE MEASURING PRECISION**—All Ex-Cell-O Contour Projectors not only read to tenths—they measure to tenths.

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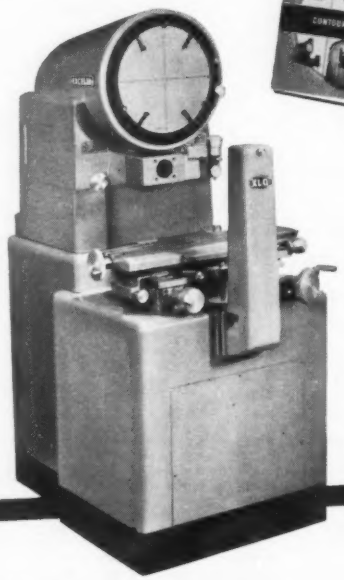


*Manufactured by EX-CELL-O Corporation at Detroit, Mich.

SOLD AND SERVICED BY

OPTICAL GAGING PRODUCTS, INC.

26 FORBES STREET ROCHESTER 11, N. Y.

(A subsidiary of EX-CELL-O Corporation)

Steel Prices

Mill prices as reported to STEEL, June 15, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 150, footnotes, page 152.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOTS, Alloy (NT)
Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon Rerolling (NT)
Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3..104.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 .....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14..99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .126.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 .....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 .....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14.119.00
S.Duquesne,Pa. U5 ....119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2, W14 122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 .....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburgh,Calif. C11 ...7.20
Portsmouth,O. P12 .....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2 ..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 .....5.60
Lackawanna,N.Y. B2 ..5.55
Los Angeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill.U5, W14...5.50
S.SanFrancisco B3 .....6.15
Sterling,Ill. N15 .....5.50
Torrance,Calif. C11 .....6.20
Weirton,W.Va. W6 .....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ....5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5.50
Weirton,W.Va. W6 .....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1.8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 .....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ...6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ...6.50
Weirton,W.Va. W6 .....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. C22 ....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 .....5.40
Harrisburg,Pa. P4 .....5.30
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 ....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 .....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. C22 ....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1.7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2...7.95
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy
Aliquippa,Pa. J5 .....7.50
Claymont,Del. C22 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2...7.50
Youngstown Y1 .....7.50

FLOOR PLATES
Cleveland J5 .....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron
Ashland c.l.(15) A10 ....5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 .....6.05
Warren,O. R2 .....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ...5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5 ..5.925
Lackawanna(9) B2 .....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ...6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 .....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24,B3,N15..6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ...5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 .....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Fairless,Pa. U5 .....6.875
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 .....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 .....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 .....6.725
Pittsburgh J5 .....6.725
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14..6.725
S.Duquesne,Pa. U5 .....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 .....8.55
Lackawanna,N.Y. B2 ...8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 .....9.05
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon
Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 .....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ....6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron
Economy,Pa. B14 .....16.45

BAR SHAPES, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 .....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded (Including leaded extra) Carbon
LosAngeles P2, S30 ..11.75*

Alloy
Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 .....10.35
SpringCity,Pa. K3 .....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 .....7.65
BeaverFalls,Pa. M12,R2.7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 .....7.65
Detroit B5, P17 .....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ....7.65
Gary,Ind. R2 .....7.65
GreenBay, Wis. F7 .....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 .....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 .....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 .....8.20
Massillon,O. R2, R8 ...7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 .....7.90
Putnam,Conn. W18 .....8.20
Readville,Mass. C14 .....8.20
S.Chicago,Ill. W14 .....7.65
SpringCity,Pa. K3 .....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon (Turned and Ground)
Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 .....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.025
Detroit B5, P17 .....9.225
Detroit S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay, Wis. F7 .....9.025
Hammond,Ind.J5, L2..9.025
Hartford,Conn. R2 .....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 .....9.225
S.Chicago,Ill. W14 .....9.025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025

Waukegan, Ill. A7 ....9.025
Willimantic, Conn. J5 ..9.325
Worcester, Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity, Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse, Mich. G5 .....5.675
Emeryville, Calif. J7 ...6.425
Fairfield, Ala. T2 .....5.675
Fairless, Pa. U5 .....5.825
Fontana, Calif. K1 ....6.375
Ft. Worth, Tex. (26) T4 5.25
Gary, Ind. U5 .....5.675
Houston S5 .....5.925
Ind. Harbor, Ind. I-2, Y1 .5.675
Johnstown, Pa. B2 ....5.675
Joliet, Ill. P22 .....5.675
KansasCity, Mo. S5 ....5.925
Kokomo, Ind. C16 .....5.775
Lackawanna, N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison, Ill. L1 .....5.875
Milton, Pa. M18 .....5.825
Minnequa, Colo. C10 ....6.125
Niles, Calif. P1 .....6.375
Pittsburg, Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland, Oreg. O4 ....6.425
SandSprings, Okla. S5 ..5.925
Seattle A24, B3, N14 ..6.425
S. Chicago, Ill. R2, W14 .5.675
S. Duquesne, Pa. U5 ....5.675
S. SanFrancisco B3 ....6.425
SparrowsPoint, Md. B2 ..5.675
Sterling, Ill. (1) N15 ....5.675
Sterling, Ill. N15 .....5.775
Struthers, O. Y1 .....5.675
Tonawanda, N.Y. B12 ..6.10
Torrance, Calif. C11 ...6.375
Youngstown R2, U5 ...5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.60
Johnstown, Pa. B2 .....7.33
KansasCity, Mo. S5.....7.60
Lackawanna, N.Y. B2 ..7.35
Marion, O. P11 .....6.70
Newark, N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings, Okla. S5 ..7.60
Seattle A24, B3, N14 ..7.95
SparrowsPt., Md. B2 ....7.33
St. Paul U8 .....8.17
Williamsport, Pa. S19 ...7.25

BARS, Wrought Iron

Economy, Pa. (S. R.) B14 15.10
Economy, Pa. (D. R.) B14 19.30
Econ. (DirectRolled) B14 13.55
Economy (Staybolt) B14 .19.80
McK. Rks. (S. R.) L5 ....14.50
McK. Rks. (D. R.) L5 ...19.80
McK. Rks. (Staybolt) L5. 20.95

BARS, Rail Steel

ChicagoHts. (3) C2, I-2 .5.575
ChicagoHts. (4) (44) I-2 .5.675
ChicagoHts. (4) C2 ....5.675
Franklin, Pa. (3) F5 ...5.575
Franklin, Pa. (4) F5 ...5.675
JerseyShore, Pa. (3) J8 ..5.55
Marion, O. (3) P11 ....5.575
Tonawanda (3) B12 ....5.575
Tonawanda (4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity, Ala. R2 ..5.10
Allenport, Pa. P7 .....5.10
Aliquippa, Pa. J5 .....5.10
Ashland, Ky. (8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken, Pa. A3 ..5.15
Detroit (8) M1 .....5.10
Ecorse, Mich. G5 .....5.10
Fairfield, Ala. T2 .....5.10
Fairless, Pa. U5 .....5.15
Farrell, Pa. S3 .....5.10
Fontana, Calif. K1 ....5.825
Gary, Ind. U5 .....5.10
Geneva, Utah C11 .....5.20
GraniteCity, Ill. (8) G4 ..5.20
Ind. Harbor, Ind. I-2, Y1 .5.10
Irvin, Pa. U5 .....5.10
Lackawanna, N.Y. B2 ..5.10
Mansfield, O. E6 .....5.10
Munhall, Pa. U5 .....5.10
Newport, Ky. A2 .....5.10
Niles, O. M21, S3 .....5.10
Pittsburg, Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth, O. P12 ....5.10
Riverdale, Ill. A1 .....5.10
Sharon, Pa. S3 .....5.10
S. Chicago, Ill. U5, W14 ..5.10
SparrowsPoint, Md. B2 ..5.10
Steubenville, O. W10 ....5.10
Warren, O. R2 .....5.10
Weirton, W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles, O. M21, S3 .....6.275

SHEETS, H.R., Alloy

Gary, Ind. U5 .....8.40
Ind. Harbor, Ind. Y1 ....8.40
Irvin, Pa. U5 .....8.40
Munhall, Pa. U5 .....8.40
Newport, Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa, Pa. J5 .....7.525
Ashland, Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken, Pa. A3 ..7.575
Ecorse, Mich. G5 .....7.525
Fairfield, Ala. T2 .....7.525
Fairless, Pa. U5 .....7.575
Farrell, Pa. S3 .....7.525
Fontana, Calif. K1 .....8.25
Gary, Ind. U5 .....7.525
Ind. Harbor, Ind. 1-2, Y1 7.525
Irvin, Pa. U5 .....7.525
Lackawanna (35) B2 ..7.525
Munhall, Pa. U5 .....7.525
Niles, O. S3 .....7.525
Pittsburgh J5 .....7.525
S. Chicago, Ill. U5, W14 .7.525
Sharon, Pa. S3 .....7.525
SparrowsPoint (36) B2..7.525
Warren, O. R2 .....7.525
Weirton, W. Va. W6 ....7.525
Youngstown U5, Y1 ....7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland, Ky. (8) A10 ....5.35
Cleveland R2 .....5.875
Warren, O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown, O. A10 ....6.775
Warren, O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity, Ala. R2 ..6.275
Aliquippa, Pa. J5 .....6.275
Allenport, Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken, Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse, Mich. G5 .....6.275
Fairfield, Ala. T2 .....6.275
Fairless, Pa. U5 .....6.325
Follansbee, W.Va. F4 6.275
Fontana, Calif. K1 .....7.40
Gary, Ind. U5 .....6.275
GraniteCity, Ill. G4 ....6.375
Ind. Harbor, Ind. I-2, Y1 6.275
Irvin, Pa. U5 .....6.275
Lackawanna, N.Y. B2 ..6.275
Mansfield, O. E6 .....6.275
Middletown, O. A10 ....6.275
Newport, Ky. A2 .....6.275
Pittsburg, Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth, O. P12 ....6.275
SparrowsPoint, Md. B2..6.275
Steubenville, O. W10 ....6.275
Warren, O. R2 .....6.275
Weirton, W. Va. W6 ....6.275
Yorkville, O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa, Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse, Mich. G5 .....9.275
Fairless, Pa. U5 .....9.325
Fontana, Calif. K1 ....10.40
Gary, Ind. U5 .....9.275
Ind. Harbor, Ind. I-2, Y1 9.275
Lackawanna (38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint (33) B2..9.275
Warren, O. R2 .....9.275
Weirton, W. Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala. City, Ala. R2	7.225	....
Ashland, Ky. A10	7.225	7.475
Canton, O. R2	7.225	....
Fairfield, Ala. T2	7.225	7.475
Gary, Ind. U5	7.225	7.475
GraniteCity, Ill. G4	7.325	....
Ind. Harbor I-2	7.225	7.475
Irvin, Pa. U5	7.225	7.475
Kokomo, Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts., Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind. Harbor, Ind. I-2 ....7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity, Ala. R2..6.875‡
Ashland, Ky. A10 ....6.875‡
Canton, O. R2 .....6.875‡
Dover, O. E6 .....6.875†
Fairfield, Ala. T2 ....6.875†
Gary, Ind. U5 .....6.875†
GraniteCity, Ill. G4 ....6.975*
Ind. Harbor, Ind. I-2 ..6.875†
Irvin, Pa. U5 .....6.875†
Kokomo, Ind. C16 ....6.975‡
MartinsFerry, O. W10..6.875*
Middletown, O. A10 ..6.875†
Pittsburg, Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt., Md. B2 ..6.875†
Warren, O. R2 .....6.875†
Weirton, W. Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin, Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt. (39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton, O. R2 .....7.275
Irvin, Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland, Ky. A10 .....7.125
Middletown, O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland (28) R2 .....7.65
Niles, O. (28) R2 .....7.65
Weirton, W. Va. W6 ....7.50
Youngstown J5 .....7.50

SHEETS, Well Casing

Fontana, Calif. K1 ....7.325

SHEETS, Aluminum Coated

Butler, Pa. A10 (type 1) 9.525
Butler, Pa. A10 (type 2) 9.625
Irvin, Pa. U5 (type 1) ..9.525

SHEETS, Enameling

Ashland, Ky. A10 ....6.775
Cleveland R2 .....6.775
Fairfield, Ala. T2 .....6.775
Gary, Ind. U5 .....6.775
Ind. Harbor, Ind. I-2, Y1 6.775
Irvin, Pa. U5 .....6.775
Middletown, O. A10 ....6.775
Niles, O. M21, S3 .....6.775
SparrowsPoint, Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover, O. E6 .....8.70
Ind. Harbor, Ind. I-2 ....8.70
Mansfield, O. E6 .....8.70
Warren, O. R2 .....8.70
Yorkville, O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom, W. Va. W10 7.225
Gary, Ind. U5 .....7.225
Mansfield, O. E6 .....7.225
Middletown, O. A10 ....7.225
Niles, O. M21, S3 .....7.225
Warren, O. R2 .....7.225
Weirton, W. Va. W6 ....7.225

SHEETS, Long Terne, Ingot Iron

Middletown, O. A10 ....7.625

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N. Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas & Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapman & Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S. & W. Co.
N20 Neville Ferro Alloy Co.
O4 Oregon Steel Mills
P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala. City, Ala. (27) R2 ...5.10
Allenport, Pa. P7 .....5.10
Alton, Ill. L1 .....5.30
Ashland, Ky. (8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer, Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken, Pa. A3 ..5.15
Detroit M1 .....5.10
Ecorse, Mich. G5 .....5.10
Fairfield, Ala. T2 .....5.10
Farrell, Pa. S3 .....5.10
Fontana, Calif. K1 ....5.825
Gary, Ind. U5 .....5.10
Ind. Harbor, Ind. I-2, Y1..5.10
Johnstown, Pa. (25) B2 ..5.10
Lackaw'na, N.Y. (25) B2.5.10
LosAngeles (25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa, Colo. C10 ....6.20
Riverdale, Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle (25) B3 .....6.10
Seattle N14 .....6.60
Sharon, Pa. S3 .....5.10
S. Chicago, Ill. W14 .....5.10
S. SanFrancisco (25) B3..5.85
SparrowsPoint, Md. B2 ..5.10
Torrance, Calif. C11 ....5.85
Warren, O. R2 .....5.10
Weirton, W.Va. W6 .....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie, Pa. S18 .....8.40
Farrell, Pa. S3 .....8.40
Gary, Ind. U5 .....8.40
Houston S5 .....8.65
Ind. Harbor, Ind. Y1 ....8.40
KansasCity, Mo. S5 ....8.65
LosAngeles B3 .....9.60
Lowellville, O. S3 .....8.40
Newport, Ky. A2 .....8.40
Sharon, Pa. A2, S3 ....8.40
S. Chicago, Ill. W14 .....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland, Ky. A10 .....7.575
Bessemer, Ala. T2 .....7.575
Conshohocken, Pa. A3 ..7.575
Ecorse, Mich. G5 .....7.575
Fairfield, Ala. T2 .....7.575
Farrell, Pa. S3 .....7.575
Gary, Ind. U5 .....7.575
Ind. Harbor, Ind. I-2, Y1 7.575
Lackawanna, N.Y. B2 ..7.575
LosAngeles (25) B3 ....8.325
Seattle (25) B3 .....8.575
Sharon, Pa. S3 .....7.575
S. Chicago, Ill. W14 ....7.575
S. SanFrancisco (25) B3 .8.325
SparrowsPoint, Md. B2 .7.575
Warren, O. R2 .....7.575
Weirton, W.Va. W6 ....7.575
Youngstown U5, Y1 ..7.575

STRIP, Hot-Rolled Ingot Iron

Ashland, Ky. (8) A10 ....5.35
Warren, O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson, Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 .....7.425
Dearborn, Mich. S3 ....7.425
Detroit D2, M1, P20 .7.425
Dover, O. G6 .....7.425
Evanston, Ill. M22 ....7.525
Farrell, Pa. S3 .....7.425
Follansbee, W.Va. W10 .7.425
Fontana, Calif. K1 .....9.20
FranklinPark, Ill. T6 ..7.525
Ind. Harbor, Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport, Pa. E10 ..7.525
NewBedford, Mass. R10.7.875
NewBritain, Conn. S15..7.875
NewCastle, Pa. B4, M22.7.425
NewHaven, Conn. D2 ..7.875
NewKensington, Pa. A6.7.425
Pawtucket, R.I. R3, N8.7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale, Ill. A1 .....7.525
Rome, N.Y. (32) R6 ....7.425
Sharon, Pa. S3 .....7.425
Trenton, N.J. (31) R5 ..8.875
Warren, O. R2, T5 ....7.425
Worcester, Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Carnegie, Pa. S18 .....15.55
Cleveland A7 .....15.55
Dover, O. G6 .....15.55
Farrell, Pa. S3 .....15.55
FranklinPark, Ill. T6 ..15.55
Harrison, N.J. S18 ....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville, O. S3 .....15.55
Pawtucket, R.I. N8 ....15.90
Riverdale, Ill. A1 .....15.55
Sharon, Pa. S3 .....15.55
Worcester, Mass. A7 ....15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn, Mich. S3 ....10.80
Dover, O. G6 .....10.80
Farrell, Pa. S3 .....10.80
Ind Harbor, Ind. Y1 ....10.80
Sharon, Pa. S3 .....10.80
Warren, O. R2 .....10.80
Weirton, W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie, Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn, Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover O. G6	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. M22	8.95	10.40	12.60	15.60	....
Farrell, Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria, O. S1	10.05	10.40	12.60	15.60	....
FranklinPark, Ill. T6	9.05	10.40	12.60	15.60	18.55
Harr'son, N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain, Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle, Pa. B4, M22	8.95	10.40	12.60	15.60	....
NewHaven, Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington, Pa. A6	9.85	10.40	12.60	15.60	....
NewYor W3	....	10.70	12.90	16.10	19.30
Pawtucket, R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome, N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton, N.J. R5	....	10.70	12.90	15.90	18.85
Warren, O. T5	8.95	10.40	12.60	15.60	18.55
Worcester, Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)			Up to 0.80C	0.81-1.05C	1.06-1.35C
Br' tol, Conn. W1	...	...	18.85	22.95	27.80
Buffalo W12	...	...	18.85	....	....
Fostoria, O. S1	...	...	19.05	22.15	....
FranklinPark, Ill. T6	...	...	19.20	23.30	28.15
Harrison, N.J. C18	...	...	18.85	22.95	27.80
NewYork W3	...	...	18.85	22.95	27.80
Palmer, Mass. W12	...	...	18.85	....	....
Trenton, N J. R5	...	...	18.85	22.95	27.80
Worcester, Mass. A7, T6	...	...	18.85	22.95	27.80
Youngstown S41	...	...	19.20	23.30	28.15

STRIP, Cold-Rolled Ingot Iron

Warren, O. R2 .....8.175

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover, O. G6 .....7.425*
Evanston, Ill. M22 ....7.525*
McKeesport, Pa. E10 ..7.50*
NewCastle, Pa. M22 ..7.425*
Riverdale, Ill. A1 .....7.525*
Warren O. B9, S3, T5.7.425*
Worcester, Mass. A7 ...7.975
Youngstown S41, Y1 .7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell, Pa. S3 .....7.50
Sharon, Pa. S3 .....7.50

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell, Pa. S3 .....5.525
Riverdale, Ill. A1 .....5.675
Sharon, Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa Pa. J5	$9.10	$9.35	$9.75
Fairfield, Ala. T2	9.20	9.45	9.85
Fairless Pa. U5	9.20	9.45	9.85
Fontana, Calif. K1	9.75	10.00	10.40
Gary, Ind. U5	9.10	9.35	9.75
GraniteCity, Ill. G4	9.20	9.45	9.60
IndianaHarbor, Ind. I-2, Y1	9.10	9.35	9.75
Irvin, Pa. U5	9.10	9.35	9.75
Niles, O R2	9.10	9.35	9.75
Pittsburg Calif. C11	9.75	10.00	10.40
SparrowsPoint, Md. B2	9.10	9.35	9.75
Weirton, W.Va. W6	9.10	9.35	9.75
Yorkv'lle, O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)			
Aliquippa, Pa. J5 (21-27 Ga.)	....	7.90	8.10
IndianaHarbor, Ind. Y1 (20-27 Ga.)		7.90	....
Niles, O. R2 (20-27 Ga.)	....	7.90	8.10

TIN PLATE, Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa, Pa. J5	$10.40	$10.65
Fairfield, Ala. T2	10.50	10.75
Fontana, Calif. K1	11.05	11.30
Gary, Ind. U5	10.40	10.65
Ind Harb. Y1	10.40	10.65
Irvin, Pa. U5	10.40	10.65
Pitts., Calif. C11	11.05	11.30
Sp. Pt., Md. B2	10.40	10.65
Weirton, W. Va. W6	10.40	10.65
Yorkville, O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa, Pa. J5 .....$8.20
Fairfield, Ala. T2 .....8.30
Fairless, Pa. U5 .....8.30
Fontana, Calif. K1 .....8.85
Gary, Ind. U5 .....8.20
GraniteCity G4 .....8.30
Ind. Harbor, Ind. I-2, Y1 8.20
Irvin, Pa. U5 .....8.20
Niles, O. R2 .....8.20
Pittsburg, Calif. C11 ....8.85
SparrowsPoint, Md. B2..8.20
Weirton, W. Va. W6 .....8.20
Yorkville, O. W10 .....8.20

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa, Pa. J5 .....7.85
Gary Ind. U5 .....7.85
GraniteCity, Ill. G4 .....7.95
Ind. Harbor, Ind. Y1 .....7.85
Irvin, Pa. U5 .....7.85
Yorkville, O. W10 .....7.85

MANUFACTURING TERNES (Special Coated, Base Box)

Gary, Ind. U5 .....$10.05
Irvin, Pa. U5 .....10.05

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.) Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom, W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge, Pa. A4	....	....	12.40	13.55	14.65
GraniteCity Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor, Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield, O. E6	9.875*	11.70	12.40	13.55	14.65
Newport, Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles, O M21	9.875*	11.70	12.40	13.56	....
Vandergrift, Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren, O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville, O. A10	....	11.70†	12.40	13.55	14.65
Vandergrift, Pa. U5					8.10
Mansfield, O. E6					8.10
Warren, O. R2 (Silicon Lowcore)					8.10

SHEETS (22 Ga., coils & cut lengths) Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom, W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift, Pa. U5	15.70	16.30	16.80	17.85
Zanesville, O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge, Pa. A4.	18.10	19.70	20.20	20.70	15.70††	
Butler, Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift, Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren, O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity, Ala. R2 ..8.00
Aliquippa, Pa. J5 .....8.00
Alton, Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville, Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville, Ind. M8..8.10
Donora, Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield, Ala. T2 .....8.00
Fostoria, O. (24) S1 ....8.10
Houston S5 .....8.25
Jacksonville, Fla. M8 ....8.35
Johnstown, Pa. B2 .....8.00
Joliet, Ill. A7 .....8.00
KansasCity, Mo. S5 ....8.25
Kokomo, Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa, Colo. C10 ....8.25
Monessen, Pa. P7, P16..8.00
Palmer, Mass. W12 .....8.30
Pittsburg, Calif. C11 ....8.95
Portsmouth, O. P12 ....8.00
Rankin, Pa. A7 .....8.00
S. Chicago, Ill. R2 .....8.00
S. SanFrancisco C10 ....8.95
SparrowsPoint, Md. B2 ..8.10
Sterling Ill. (1) N15 ....8.00
Sterling, Ill. N15 .....8.10
Struthers, O. Y1 .....8.00
Waukegan, Ill. A7 .....8.00
Worcester, Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria, O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville, Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora, Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown, Pa. B2 ....13.40
KansasCity, Mo. U3 ...12.90
Minnequa, Colo. C10 ..12.775
Monessen, Pa. P7, P16..12.65
Muncie, Ind. I-7 .....13.60
NewHaven, Conn. A7 ....12.95
Palmer Mass. W12 .....13.70
Pittsburg, Calif. C11 ....13.45
Portsmouth, O. P12 ....12.65
Roebling, N.J. R5 .....12.95
SparrowsPt., Md. B2 ....13.50
Struthers, O. Y1 .....13.40
Trenton, N.J. A7 .....12.95
Waukegan, Ill. A7 .....12.65
Worcester, Mass. A7 ....12.95

WIRE, Upholstery Spring

Aliquippa, Pa. J5 .....9.75
Alton, Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora, Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown, Pa. B2 .....9.75
KansasCity, Mo. S5, U3.10.00
Kokomo Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa, Colo. C10 ....9.95
Monessen, Pa. P7, P16 ..9.75
NewHaven, Conn. A7 ..10.05
Palmer, Mass. W12 ....10.05
Pittsburg, Calif. C11 ..10.70
Portsmouth, O. P12 ....9.75
Roebling, N.J. R5 .....10.05
S. Chicago, Ill. R2 .....9.75
S. SanFrancisco C10 ....10.70
SparrowsPt., Md. B2 ....9.85
Struthers, O. Y1 .....9.75
Trenton, N.J. A7 .....10.05
Waukegan, Ill. A7 .....9.75
Wor'ster, Mass. A7, J4, T6 10.05

WIRE, MB Spring, High-Carbon

Aliquippa, Pa. J5 .....9.75
Alton, Ill. L1 .....9.95
Bartonville, Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora, Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria, O. S1 .....9.80
Johnstown, Pa. B2 .....9.75
KansasCity, Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Millbury, Mass. (12) N6..10.05
Minnequa, Colo. C10 ....9.95
Monessen, Pa. P7, P16..9.75
Muncie, Ind. I-7 .....9.95
Palmer, Mass. W12 ....10.05
Pittsburg, Calif. C11 ....10.70
Portsmouth O. P12 ....9.75
Roebling, N J. R5 .....10.05
S. Chicago, Ill. R2 .....9.75
S. SanFrancisco C10 ....10.70
SparrowsPt., Md. B2 ....9.85
Struthers, O. Y1 .....9.75
Trenton, N.J. A7 .....10.05
Waukegan, Ill. A7 .....9.75
Wor'ster, Mass. A7, J4, T6 10.05

WIRE, Fine & Weaving (8" Coils)

Alton, Ill. L1 .....16.50
Bartonville, Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville, Ind. M8.16.40
Fostoria, O. S1 .....16.30
Houston S5 .....16.55
Jacksonville, Fla. M8 ..16.65
Johnstown Pa. B2 ....16.30
KansasCity, Mo. S5 ....16.55
Kokomo, Ind. C16 .....16.30
Minnequa, Colo. C16 ....16.55
Monessen, Pa. P16 ....16.30
Muncie, Ind. I-7 .....16.50
Palmer Mass. W12 .....16.60
S. SanFrancisco C10 ....17.15
Waukegan, Ill. A7 .....16.30
Worcester, Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville, Ill. K4 .....13.45
Buffalo W12 .....13.45
Fostoria, O. S1 .....13.45
KansasCity, Mo. U3 ....13.70
Johnstown, Pa. B2 ....13.45
Monessen, Pa. P7 .....13.45
Muncie Ind. I-7 .....13.65
Palmer, Mass. W12 ....13.75
Portsmouth, O. P12 ....13.45
Roebling, N.J. R5 .....13.75
St. Louis L8 .....13.45
SparrowsPt., Md. B2 ..13.56
Struthers, O. Y1 .....13.45
Worcester, Mass. J4 ....13.75
(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock Sizes — Col.

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES — Col.

AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	177
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.)(per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.49
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.79
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.84
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop — Col.

AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — Col.

Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	198§
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WOVEN FENCE, 9-15 Ga. — Col.

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	192§
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE (16 gage)	An'ld Galv. Stone	Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Cleveland A7	17.85	....
Craw'dville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitt.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WIRE, Merchant Quality (6 to 8 gage)	An'ld Galv.
Ala.City,Ala. R2	9.00 9.55**
Aliquippa J5	8.65 9.325§
Atlanta(48) A11	9.10 9.775§
Bartonville(48) K4	9.85 19.90
Buffalo W12	9.00 9.55†
Cleveland A7	9.00 ....
Crawfordsville M8	9.10 9.80††
Donora,Pa. A7	9.00 9.55†
Duluth A7	9.00 9.55†
Fairfield T2	9.00 9.55†
Houston(48) S5	9.25 9.80**
Jack'ville,Fla. M8	9.10 9.80‡‡
Johnstown(48) B2	9.00 9.675§
Joliet,Ill. A7	9.00 9.55†
KansasCity(48)S5	9.25 9.80**
Kokomo(48) S16	9.10 9.65†
LosAngeles B3	9.95 10.625§
Minnequa C10	9.25 9.80**
Monessen(48) P7	8.65 9.35§
Palmer,Mass. W12	9.30 9.85†
Pitts.,Calif. C11	9.95 10.50†
Rankin,Pa. A7	9.00 9.55†
S.Chicago R2	9.00 9.55**
S.SanFran. C10	9.95 10.50**
Spar'wsPt.(48)B2	9.10 9.775§
St'ling(37)(48)N15	9.10 9.80
Struthers,O. Y1	9.00 9.65†
Worcester,Mass.A7	9.30 9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packages	43.75
Bulk	50

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packages	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:	
Packages	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam, 6 in. and shorter:	
Packages	+5
Bulk	+19
Through 1 in. diam., longer than 6 in.:	
Packages	+29

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great. Structural ½ in., larger 12.85 ⅞ in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches 1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2½	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.40c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.: 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds, 9.65c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	31.25	42.00	43.75	47.00	49.50	45.75	55.00	55.00
304L	....	....	49.75	51.50	54.75	57.25	53.50	62.75	62.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.25	75.75	71.75	80.75	80.75
316L	....	....	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.00	65.50
330	....	....	123.25	....	113.00	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co., Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates—Carbon Base 5%	10%	15%	20%	Sheets—Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	56.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.80	44.20

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	V-Cr Hot Work (H-13)	0.550
Spec. Carbon (W-1)	0.385	W-Cr Hot Work (H-12)	0.530
Oil Hardening (O-1)	0.505	W Hot Wk. (H-21)	1.425-1.44
V-Cr Hot Work (H-11)	0.505	Hi-Carbon-Cr (D-11)	0.955

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	....	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon, Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.50	76.00	....
Newark, N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKees Rocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa., deld.	....	68.26	68.26	69.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa., deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Everett, Mass. E1	67.50	68.00	68.50	....
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50†	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Seattle, 10,000 lb and in San Francisco, 2000 to 4999 lb. City delivery charges are 15 cents per 100 lb except; Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	8.27	8.66	10.06	....	8.28	8.95	11.80	16.38	9.53	8.84	10.43
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.05
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.80	9.95	11.15	55.98	10.65	9.00	11.45	16.30	9.65	9.00	10.85
Charlotte, N. C.	10.81	11.22	11.34	....	12.29	10.97	12.68	....	11.38	11.17	12.18
Chicago	8.74	10.20	10.95	53.00	10.40	8.84	10.65	15.95	9.33	8.67	10.46
Cincinnati	8.91	10.26	11.00	53.43	10.72	9.16	11.53	16.27	9.89	9.05	10.79
Cleveland	8.73	9.88	11.14	52.33	10.51	8.96	11.25	16.06	9.75	8.92	10.56
Dallas	9.62	10.05	12.59	....	11.18	9.03	12.98	16.95	9.26	9.35	11.00
Detroit	9.00	10.46	11.30	56.50	10.77	9.15	11.01	16.23	9.89	9.04	10.72
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.60	11.83
Houston	9.22	9.65	12.19	52.00	10.78	8.63	13.10	16.55	8.86	8.95	10.60
Indianapolis	9.18	10.64	11.39	....	10.84	9.28	11.09	16.39	9.77	9.11	10.90
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	9.59	11.29	12.20	57.60	11.29	9.67	14.20	17.35	10.54	9.82	11.79
Memphis, Tenn.	9.84	10.05	....	....	11.24	9.92	12.74	....	10.33	10.12	11.41
Milwaukee	8.88	10.34	11.09	....	10.54	8.98	10.89	16.09	9.55	8.81	10.60
Moline, Ill.	9.24	10.70	11.45	....	10.90	9.34	11.15	16.45	9.83	9.17	10.96
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.05
New York	9.36	10.13	11.35	53.08	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	8.85	9.60	10.66	52.17	10.85	9.25	11.95	16.38	9.45	9.20	10.45
Pittsburgh	8.43	9.88	11.03	52.33	10.49	8.85	11.25	15.95	9.36	8.68	10.32
Portland, Oreg.	10.20	12.05	12.35	....	12.20	10.20	16.65	17.80	10.80	10.35	12.50
St. Louis	8.84	10.58	11.33	....	10.50	8.95	11.28	16.33	9.45	8.78	10.57
St. Paul	9.00	9.59	10.74	....	10.66	9.12	11.49	16.54	9.63	8.95	10.44
San Francisco	10.17	11.69	11.45	55.10	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	10.07	11.44	12.05	56.52	11.84	9.96	16.20	17.80	10.59	10.17	12.46
Spokane, Wash	9.92	11.29	11.90	56.52	11.69	9.81	16.20	17.80	10.44	10.02	12.31

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, ¾ in.—2½ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, ¼ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore, $73.

*—9 in. x 4½ x 2.50 straights.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, concentrates	nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	23.00†
Chilean, 72-75%, c.i.f. Atlantic ports	22.00
Brazilian 68.5%, f.o.b. vessell Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.00-19.50
Domestic, concentrates, f.o.b. milling points	22.00-23.00

*Before duty. †Nominal.

Manganese Ore

Mn 46-58%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.75†
48% no ratio	24.00-26.00†

Turkish

48% 3:1	36.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard	
55-60%	$2.50-2.80
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

†Nominal.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Inches Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.87% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c)	
Annealed, 99.5% Fe.	36.75, ton, del. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron:	
90-99.9%, 3 to 20 microns, depending on grade, 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 500-lb drum freight allowed, c.l.	39.80; ton lots 41.80
Brass, 80/20, leaded (60 mesh)	40.90
Bronze, filter powder, 90/10	47.00*
Copper, all types	15.25*
Lead	7.50*
Manganese, minus 35 mesh	$1.00
Nickel	$0.95-$1.15
Nickel-Silver,	61.70
Solder	15.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	25.90
Tungsten:	Dollars
Carbon reduced, 98.8% min., minus 65 mesh	nom.**
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw, Mich., deld.	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens:	
New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.19
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.68
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.15 freight zone from works.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.75	$5.65	$5.65	$5.50	$5.85
Bar Size Angles	5.85	5.75	5.75	5.60	5.95
Structural Angles	5.65	5.55	5.55	5.40	5.75
I-Beams	5.60	5.50	5.50	5.35	5.70
Channels	5.60	5.50	5.50	5.35	5.70
Plates (basic bessemer)	6.00	5.90	5.90	5.75	6.10
Sheets, H.R.	7.50	7.55	7.40	7.30	7.65
Sheets, Galvanized, 20 Ga., 36 in. x 96 in.	9.70	9.75	9.60	9.50	9.85
Sheets, Galv. (in coils) 20 Ga., 48 in. wide	9.60	9.65	9.50	9.40	9.75
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.08	24.20	24.42	24.15	25.47
Barbed Wire (†)	6.25	6.15	6.15	6.00	6.35
Merchant Bars	5.85	5.75	5.75	5.60	5.95
Hot-Rolled Bands	6.20	6.10	6.10	5.95	6.30
Wire Rods, Thomas Commercial No. 5	*6.40*	*6.35*	*6.20*	*6.20*	*6.60*
Wire Rods, O. H., No. 5	*6.55*	*6.50*	*6.35*	*6.35*	*6.70*
Bright Common Wire Nails (‡)	8.50	7.40	7.40	7.25	7.65

†Per 82 lb net reel. ‡Per 100-lb keg, 20d nails and heavier.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per net ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton. Palmerton, Pa. 21-23% Mn, $102.50, 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va., Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained maganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractinos in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: No. 1 (Cr 61-65%, C 5-7%, Si 5-8%), 22.00c.

Blocking Chrome: No. 1 (Cr 61-65%, C 5-7%, Si 5-8%), 22.00c; No. 2 (Cr 58-63%, C 5-6%, Si 8-10%), 23.00c; No. 3 (Cr 58-63%, C 5-6%, Si 10-12%), 23.00c.

Refined Charge Chrome: No. 1 (Cr 50-55%, C 5% max, Si 2% max), 25.00c; No. 2 (Cr 56-60% C 5% max, Si 2% max), 25.00c.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 31.50c per lb contained Cr; 0.010% max, 32.50c. Delivered.
Cr 67-71%, carload, lump, bulk, 0.025% max, 34.50c; 0.05% max, 33.50c; 0.10% max, 33.25c; 0.20% max, 33.00c; 0.50% max, 32.75c; 1.0% max, 32.50c; 1.5% max, 32.25c; 2.0% max, 32.00c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy carload packed, 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, St 42-45%, C 0.05% max, 26.25c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 28.25c per lb contained Cr, 14.60c per lb contained Si; 0.75 in. x down, 29.40c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot, packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20 max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lot, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3¾ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l., packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb of briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

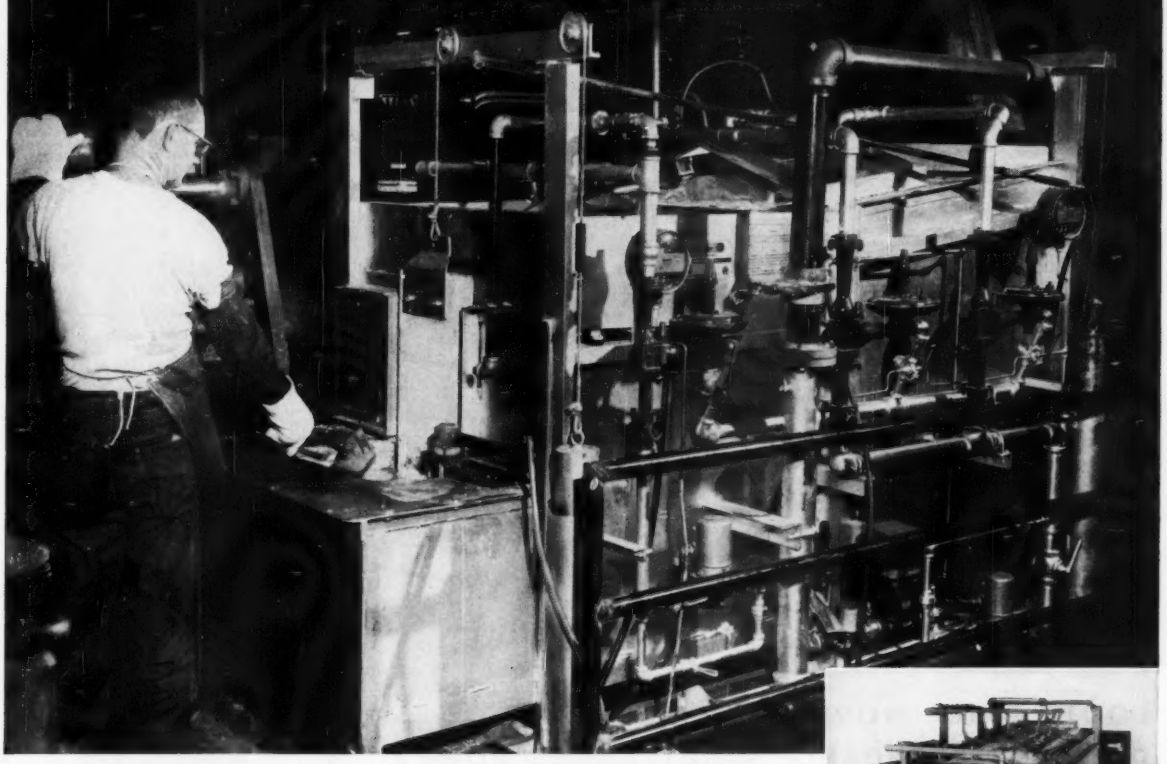
Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c, 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

HIGH PURITY ALUMINUM MELTED WITHOUT CONTAMINATION IN NEW SELAS FURNACE



Selas single-well batch melting furnace accepts 30- or 50-lb pigs. 300 lb/hr capacity. Design incorporates door at charge end and over dip-well.

Selas double-well aluminum melter holds 1,000 lb of high purity molten metal; controls temperature within close limits.

Aluminum with 99.6% minimum purity is required by the electric motor industry for die-casting of rotors.

A leading manufacturer uses Selas dry-hearth melting furnaces to meet this rigid specification for high purity molten metal. The Selas Gradiation® method provides close control of heat input; roof-fired Duradiant® burners deliver fast, uniform heating and avoid flame impingement. Advanced design prevents transfer of silica from furnace refractory to molten aluminum.

Other proven benefits include the following:

- Metal temperature in holding section is maintained within close limits due to absence of any cold charges.
- Elimination of agitation and stirring keeps dross formation at absolute minimum.
- Operates with unusual fuel economy, continuously or intermittently, utilizing natural gas and air.
- Metal "frozen" during week-end shutdown re-melts quickly, without damage to furnace.

Selas aluminum melting furnaces are available in a wide range of capacities. At your convenience . . without cost or obligation to you . . a Selas field engineer will welcome the opportunity to survey your needs. For this personal service, or for further information about these furnaces, address your request to Mr. R. E. Buckholdt, Manager, Furnace Division, Selas Corporation of America, 26 Dreshertown Road, Dresher, Pa.

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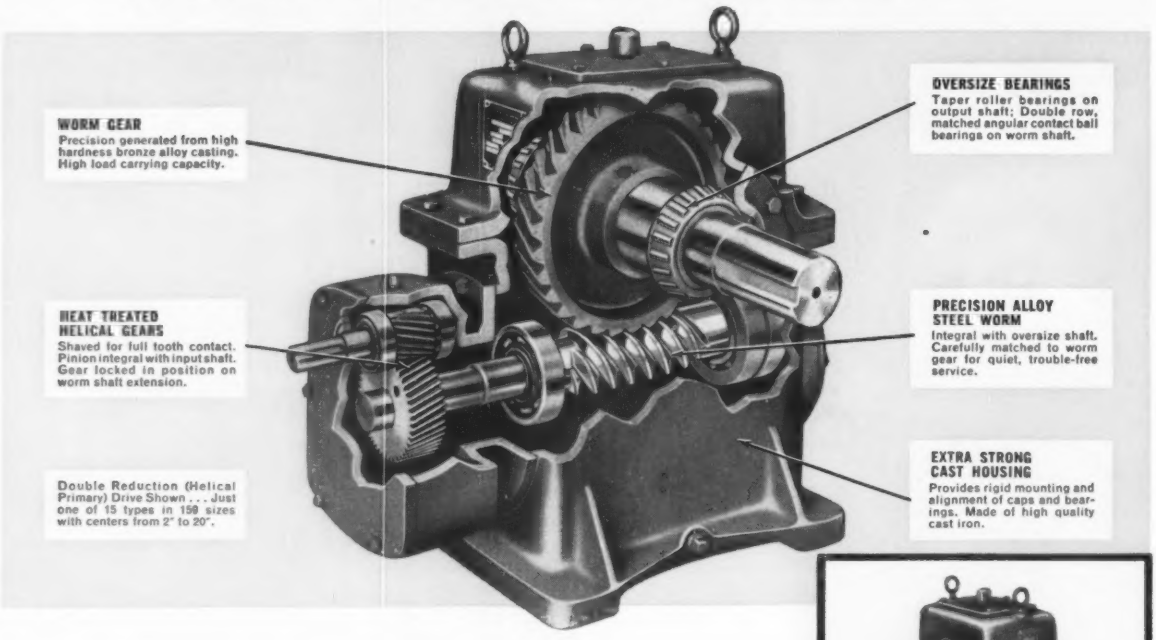
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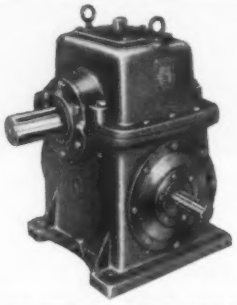

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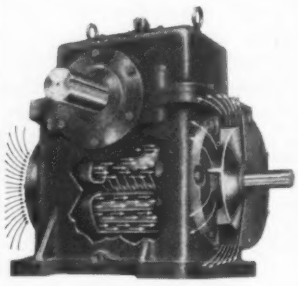

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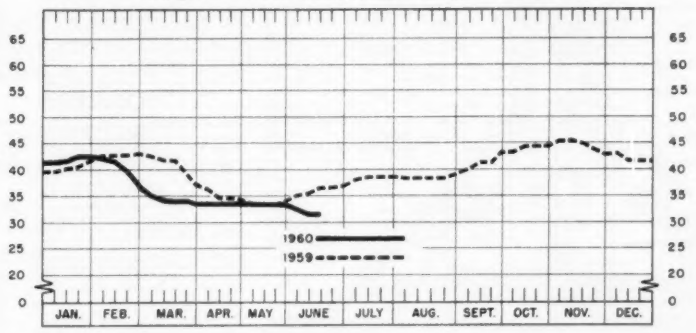
POWER TRANSMISSION DRIVES

STEELMAKING SCRAP PRICE COMPOSITE

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania—Compiled by STEEL.



June 8 1960	Week Ago	Month Ago	Year Ago	May Ave.
$31.33	$32.00	$33.33	$35.00	$33.07

Scrap Exports Provide Market Prop

Domestic demand at virtual standstill, but foreign shipments are continuing in fair volume. STEEL's composite holds at $31.33 with buying test absent

Scrap Prices, Page 160

• **Pittsburgh** — Brokers' bids on Pennsylvania Railroad scrap were from $1 to $4 less than last month's. Wheels were fairly strong at $46.66 to $47 (vs. $48.16 last time) but 2 ft rails dropped sharply. With all signs pointing toward lower steelmaking operations in July, there's little optimism in the trade. Firms that process turnings are reducing their buying prices.

• **Chicago**—Prices are holding despite the absence of representative mill buying. No real test of the market appears in the offing. Steelmaking operations in the district are holding around 63 per cent of capacity. One mill—Wisconsin Steel Div., International Harvester Co.—has announced it will close for a week or ten days following the July 4 weekend because of a lack of orders.

• **Philadelphia**—Prices on domestic orders for couplers, springs, and wheels, and on heavy breakable cast are off $1 a ton. They're quoted at $40. All other scrap prices are unchanged. Domestic trading is sluggish, but export trading is active, though it is slightly less spirited than it was a month ago. At least four full cargoes will leave this port this month, plus two part cargoes.

• **New York** — Brokers' buying prices are unchanged, except for 18-8 sheets, clips, and solids. They are off $5 a ton to $175-$180. Domestic demand for scrap is sluggish, and no early improvement is sighted. But prices are being bolstered by substantial export demand.

• **Cleveland**—Little scrap is moving, and prospects for an early pickup in demand are not promising. Steelmaking operations here and in the Valley rose slightly last week, but expectations are the upturn will prove temporary, with vacation interruptions just ahead. The most recent sale in the Valley involved a token tonnage of No. 1 industrial material, which went at $35, delivered. In general, quoted prices are nominal, largely representing brokers' and dealers' views.

• **Buffalo**—Fair export demand is providing support to the district scrap market. A considerable volume of No. 1 heavy melting steel is reported moving from this district via the Seaway to European ports. Otherwise, the local market is quiet. The district mills are taking in limited tonnage of the chief open hearth grades.

• **Cincinnati**—Prices are unchanged following the recent decline of $3 on the steelmaking grades. Some market observers think the bottom of the decline has been reached with No. 1 heavy melting quoted $26.50-$27.50, brokers' buying price. Only small lots are moving.

• **St. Louis**—The market continues inactive, and prospects for early improvement are not encouraging, especially with vacation suspensions of manufacturing plant operations just ahead. Prices are unchanged, but they are nominal in the absence of a buying test.

• **Birmingham**—Scrap is moving slowly, and brokers anticipate no improvement for at least 30 days. A buyer of No. 1 wheels cut his price $4 a ton when he returned to the market last week, and brokers cut their nominal quotations another $1 on some items. This is the longest sustained dropoff in several years, and prices are the lowest they have been since 1954. Cast iron pipe manufacturers, open hearth, and electric furnace operators are out of the market indefinitely.

• **Los Angeles**—The market continues to drift. Ten shiploads of scrap left Los Angeles harbor for Japan so far this month. Prices are firm.

• **San Francisco**—Consumption of scrap by district mills continues to be light. One large user is operating at only 35 per cent of capacity. If it weren't for exports, there would be virtually no movement.

• **Seattle**—A new price schedule is said to be fairer to both domestic and export interests. In Seattle, a new item has been added to the list: No. 1 unprepared, brokers' specifications, at $33. No. 2 material is at $30.

Some export interest has added strength to the local market situation, and the outlook is considered

(*Please turn to Page* 165)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, June 15, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

June 15	$31.33
June 8	31.33
May Avg.	33.07
June 1959	36.07
June 1955	35.44

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	25.00-26.00
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	24.00-25.00
No. 1 busheling	30.00-31.00
No. 1 factory bundles	36.00-37.00
Machine shop turnings	*14.00-15.00*
Mixed borings, turnings	*14.00-15.00*
Short turnings	*19.00-20.00*
Cast iron borings	*19.00-20.00*
Cut structurals:	
2 ft and under	*38.00-39.00*
3ft and under	*37.00-38.00*
Heavy turnings	*27.00-28.00*
Punching & plate scrap	*40.00-41.00*
Electric furnace bundles	37.00-38.00

Cast Iron Grades

No. 1 cupola	*39.00-40.00*
Stove plate	42.00-43.00
Unstripped motor blocks	32.00-33.00
Clean auto cast	47.00-48.00
Drop broken machinery	*48.00-49.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*34.00-35.00*
Rails, 2ft and under	*49.00-50.00*
Rails, 18 in. and under	*50.00-51.00*
Random rails	*45.00-46.00*
Angles, splice bars	42.00-43.00
Railroad specialties	*46.00-47.00*
Rails, rerolling	*56.00-57.00*

Stainless Steel Scrap

18-8 bundles & solids	200.00-205.00†
18-8 turnings	100.00-105.00†
430 bundles & solids	100.00-105.00†
430 turnings	50.00-55.00†

CHICAGO

No. 1 hvy melt., indus.	30.00-31.00
No. 1 hvy melt., dealer	28.00-29.00
No. 2 hvy melting	25.00-26.00
No. 1 factory bundles	34.00-35.00
No. 1 dealer bundles	29.00-30.00
No. 2 bundles	19.00-20.00
No. 1 busheling, indus.	30.00-31.00
No. 1 busheling, dealer	28.00-29.00
Machine shop turnings	14.00-15.00
Mixed borings, turnings	16.00-17.00
Shovel turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut structurals, 3 ft	35.00-36.00
Punchings & plate scrap	36.00-37.00

Cast Iron Grades

No. 1 cupola	42.00-43.00
Stove plate	37.00-38.00
Unstripped motor blocks	35.00-36.00
Clean auto cast	48.00-49.00
Drop broken machinery	48.00-49.00

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-33.00
R.R. malleable	48.00-49.00
Rails, 2 ft and under	46.00-47.00
Rails, 18 in. and under	47.00-48.00
Angles, splice bars	41.00-42.00
Axles	49.00-50.00
Rails, rerolling	49.00-50.00

Stainless Steel Scrap

18-8 bundles, solids	185.00-190.00
18-8 turnings	100.00-105.00
430 bundles & solids	85.00-90.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	25.00-26.00
No. 2 heavy melting	14.00-15.00
No. 1 bundles	28.00-29.00
No. 2 bundles	12.50-13.50
No. 1 busheling	24.00-25.00
Machine shop turnings	10.00-11.00
Mixed borings, turnings	9.00-10.00
Shovel turnings	8.00-9.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Stove plate	30.00-31.00
Heavy breakable	30.00-31.00
Unstripped motor blocks	22.00-23.00
Charging box cast	30.00-31.00
Clean auto cast	43.00-44.00

CLEVELAND

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	23.00-24.00
No. 1 factory bundles	34.00-35.00
No. 1 bundles	31.00-32.00
No. 2 bundles	17.00-18.00
No. 1 busheling	31.00-32.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	32.00-33.00
Cut structurals, plate 2 ft and under	39.00-40.00
Low phos. punchings & plate	31.00-32.00
Alloy free, short shovel turnings	17.00-18.00
Electric furnace bundles	33.00-34.00

Cast Iron Grades

No. 1 cupola	44.00-45.00
Charging box cast	33.00-34.00
Heavy breakable cast	30.00-31.00
Stove plate	39.00-40.00
Unstripped motor blocks	32.00-33.00
Brake shoes	35.00-36.00
Clean auto cast	50.00-51.00
Burnt cast	40.00-41.00
Drop broken machinery	50.00-51.00

Railroad Scrap

R.R. malleable	*48.00-49.00*
Rails, 2 ft and under	*50.00-51.00*
Rails, 18 in. and under	*51.00-52.00*
Rails, random length	*44.00-45.00*
Cast steel	*38.00-39.00*
No. 1 railroad cast	*46.00-47.00*
Railroad specialties	45.00-46.00
Angles, splice bars	45.00-46.00
Rails, rerolling	*54.00-55.00*

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	185.00-190.00
18-8 turnings	85.00-90.00
430 clips, bundles, solids	90.00-95.00
430 turnings	20.00-30.00

YOUNGSTOWN

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	25.00-26.00
No. 1 busheling	33.00-34.00
No. 1 bundles	33.00-34.00
No. 2 bundles	20.00-21.00
Machine shop turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos.	35.00-36.00
Electric furnace bundles	35.00-36.00

Railroad Scrap

No. 1 R.R. heavy melt.	*33.00-34.00*

BUFFALO

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	30.00-31.00
No. 2 bundles	22.00-23.00
No. 1 busheling	30.00-31.00
Shovel turnings	19.00-20.00
Machine shop turnings	14.00-15.00
Cast iron borings	17.00-18.00
Low phos. structurals and plate, 2 ft and under	41.00-42.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	42.00-43.00
No. 1 machinery	48.00-49.00

Railroad Scrap

Rails, random lengths	44.00-45.00
Rails, 3 ft and under	50.00-51.00
Railroad specialties	41.00-42.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	26.50-27.50
No. 2 heavy melting	22.50-23.50
No. 1 bundles	26.50-27.50
No. 2 bundles	17.50-18.50
No. 1 busheling	26.50-27.50
Machine shop turnings	10.00-11.00
Mixed borings, turnings	10.00-11.00
Shovel turnings	12.00-13.00
Cast iron borings	12.00-13.00
Low phos. 18 in.	34.00-35.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Heavy breakable cast	32.00-33.00
Charging box cast	36.00-37.00
Drop broken machinery	49.00-50.00

Railroad Scrap

No. 1 R.R. heavy melt.	31.00-32.00
Rails, 18 in. and under	52.00-53.00
Rails, random lengths	45.00-46.00

PHILADELPHIA

No. 1 heavy melting	34.00
No. 2 heavy melting	30.00
No. 1 bundles	36.00
No. 2 bundles	20.00
No. 1 busheling	36.00
Electric furnace bundles	37.00
Mixed borings, turnings	17.00†
Shovel turnings	21.00†
Machine shop turnings	15.00
Heavy turnings	28.00
Structurals & plates	38.00-40.00
Couplers, springs, wheels	*40.00*
Rail crop, 2 ft & under	56.00-57.00

Cast Iron Grades

No. 1 cupola	41.00
Heavy breakable cast	*40.00*
Drop broken machinery	51.00-52.00
Malleable	51.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	21.00-22.00
No. 1 bundles	31.00-32.00
No. 2 bundles	16.00-17.00
Machine shop turnings	7.00-8.00†
Mixed borings, turnings	8.00-9.00†
Shovel turnings	9.00-10.00†
Low phos. structurals & plates	38.00-39.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	32.00-33.00

Stainless Steel

18-8 sheets, clips solids	*175.00-180.00*
18-8 borings, turnings	80.00-85.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	70.00-75.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	25.00-25.50
No. 2 heavy melting	22.00-23.00
No. 1 bundles	25.00-25.50
No. 1 busheling	25.00-25.50
Machine shop turnings	6.00-7.00
Shovel turnings	9.00-10.00
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	28.00-29.00
No. 2 bundles	*17.00-18.00*
No. 1 busheling	*31.00-32.00*
Cast iron borings	10.00-11.00
Machine shop turnings	18.00-19.00
Shovel turnings	20.00-21.00
Bar crops and plate	37.00-38.00
Structurals & plate	36.00-37.00
Electric furnace bundles	*32.00-33.00*
Electric furnace:	
3 ft and under	32.00-33.00
2 ft and under	33.00-34.00

Cast Iron Grades

No. 1 cupola	*47.00-48.00*
Stove plate	*47.00-48.00*
Unstripped motor blocks	*37.00-38.00*
No. 1 wheels	*38.00-39.00*

Railroad Scrap

No. 1 R.R. heavy melt	28.00-29.00
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	40.00-41.00
Angles, splice bars	*39.00-40.00*

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	31.00†
No. 2 heavy melting	28.00†
No. 1 bundles	33.00†
No. 2 bundles	19.00†
No. 1 busheling	33.00†
Machine shop turnings	10.00†
Shovel turnings	12.00†

Cast Iron Grades

No. 1 cupola	45.00†
Charging box cast	37.00†
Heavy breakable cast	35.00†
Unstripped motor blocks	35.00†
Clean auto cast	47.00†
Stove plate	39.00†

Railroad Scrap

No. 1 R.R. heavy melt.	34.00†
Rails, random lengths	40.00†
Rails, rerolling	50.00†
Rails, 18 in. and under	43.00†
Angles, splice bars	41.00†

HOUSTON

(Brokers' buying prices; f.o.b. cars)

No. 1 heavy melting	34.00
No. 2 heavy melting	31.00
No. 2 bundles	19.00
Machine shop turnings	13.00-13.50
Low phos. plate & structurals	38.00-39.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable	27.00†
Foundry malleable	31.00†
Unstripped motor blocks	31.00-32.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00†

LOS ANGELES

No. 1 heavy melting	*37.00*
No. 2 heavy melting	*34.00*
No. 1 bundles	*35.00*
No. 2 bundles	*22.00*
Machine shop turnings	15.00
Shovel turnings	*18.00*
Cast iron borings	15.00
Cut structurals and plate 1 ft and under	*42.00*

Cast Iron Grades

No. 1 cupola	*41.00*

Railroad Scrap

No. 1 R.R. heavy melt.	32.00-34.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	*35.00-38.00*
No. 2 heavy melting	*32.00-35.00*
No. 2 bundles	*20.00*
Shovel turnings	15.00
Electric furnace bundles	48.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable	*33.00*
Unstripped motor blocks	*33.00*
Stove plate (f.o.b. plant)	*20.00*

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	*38.50*
No. 1 hvy (unprepared)	*33.00*
No. 2 heavy melting	*35.50*
No. 2 hvy (unprepared)	*30.00*
No. 2 bundles	23.00
Shovel turnings	15.00
Electric furnace bundles	48.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable cast	*33.00*
Unstripped motor blocks	*33.00*
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	34.00
No. 2 heavy melting	30.00
No. 1 bundles	30.00
No. 2 bundles	20.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	46.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

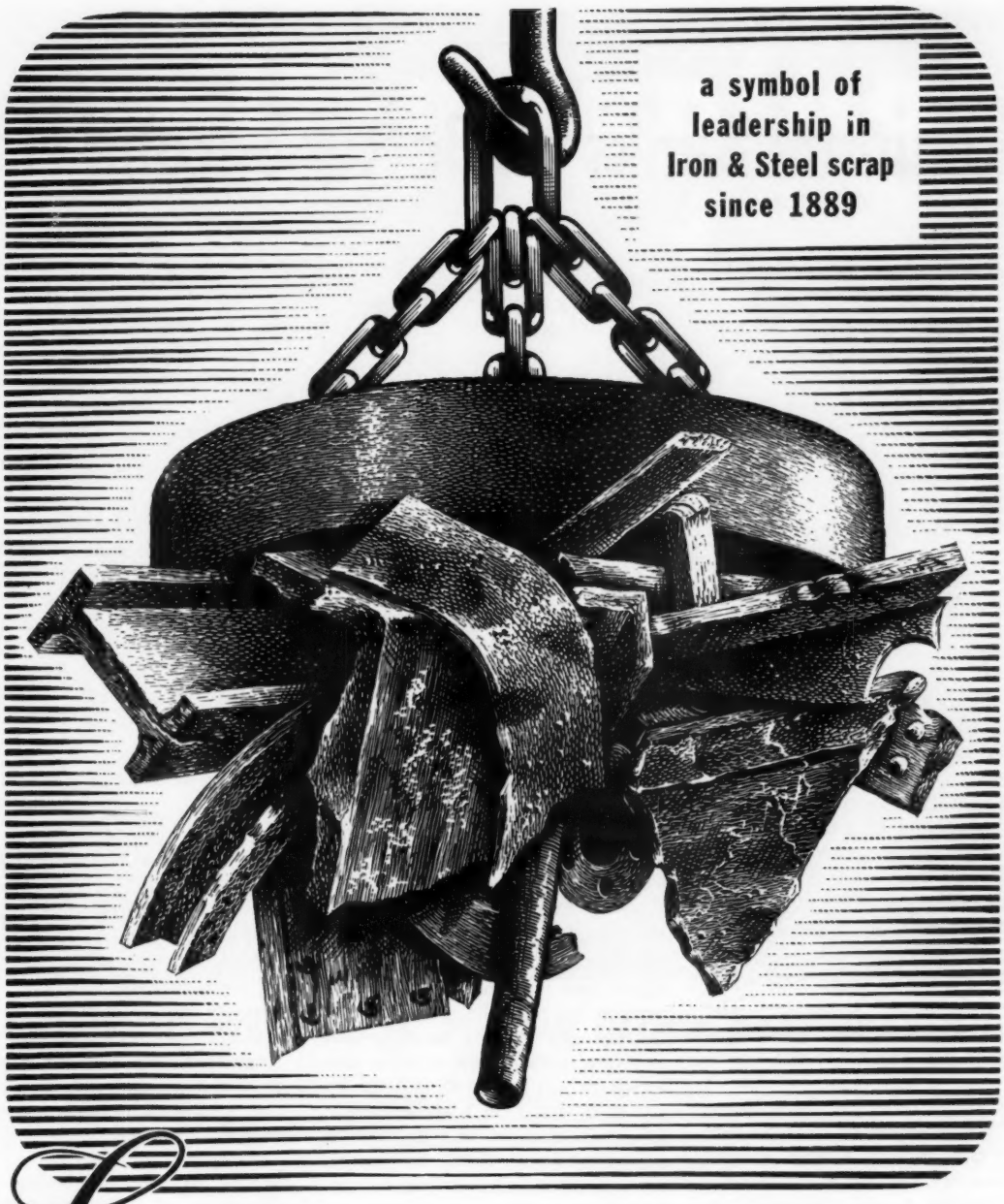
(Brokers' buying prices)

No. 1 heavy melting	25.80
No. 2 heavy melting	25.50
No. 1 bundles	25.80
No. 2 bundles	19.00
Mixed steel scrap	16.00
Mixed bornings, turnings	12.00
Busheling, new factory:	
Prepared	25.50
Unprepared	20.45
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	43.00

†Nominal.
‡F.o.b. Hamilton, Ont.



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Aluminum Banks on Better Second Half

Nonferrous Metal Prices, Pages 164 & 165

TAGGED as a year of plenty for the aluminum industry, 1960 has turned into a hard-nosed battle for markets.

Industry people still think records will be set in production, shipments, and consumption this year. But red faced forecasters, like their counterparts in many other industries have revised estimates sharply downward.

• **Output Up**—The one record that is bound to be shattered is production. Primary output is running at a yearly rate of close to 2.1 million tons, or 84 per cent of capacity. That compares with an output of 1,963,000 tons last year. Don't look for the rate to change much over the year.

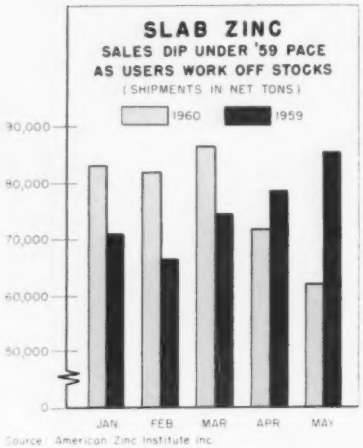
Shipments are another story. Most guessing now is that sales will top 1959's by about 5 per cent. But even that modest gain will depend entirely on the second half, because first half shipments are about 4 per cent under 1959's.

This is a far cry from 1959 when shipments jumped 39 per cent. The fact that shipments were up so much last year has worked to the industry's disadvantage this year. Here's why: Besides reflecting the rebound from the recession of 1957-58, last year's sales include a large amount of inventory buying as a hedge—first, against a strike which never came off; second, against a price hike which did (in December).

Users have been eating into those inventories all year, leading the industry to believe that consumption is running ahead of 1959's and that more users will be forced into the role of active buyers in the second half.

• **Problems of Maturity**—Aluminum is growing up, and with the growth come some pains. Aluminum's success in prior years in penetrating new markets can work to its disadvantage when business slows up. In other words, the success in achieving large poundage markets means that the industry will more and more reflect conditions of the economy.

• **Prices to Hold**—So it is unlikely that aluminum prices will go up this year even though wage rates are due to rise 6 to 8 cents an hour on Aug. 1, under a labor agreement signed last fall. Interindustry competition has never been tighter. And the industry doesn't want to give any competitive edges to other materials, which are battling hard for the sales dollar in a tight market. One indication of this tightness is the downward trend in custom smelted aluminum prices for the last three weeks.



Source: American Zinc Institute Inc.

Antitrusters at It Again

Justice Department lawyers have unofficially served notice that they're going to make it extremely tough for a primary metals company to expand via the merger route.

In the past year, the government has contested merger moves by Kennecott, Alcoa, and Reynolds. Now, the Canadian aluminum producer, Aluminium Ltd., has dropped plans to acquire Apex Smelting Co., Chicago, because of "indicated objections" on the part of Justice.

The Justice Department's reported reasoning: Within the meaning of Section 7 of the Clayton Act, the proposed acquisition of Apex "might lead to decreased competition and stimulate acquisitions by other major companies in the industry." In other words, it now seems Justice will turn down a merger on "what might be."

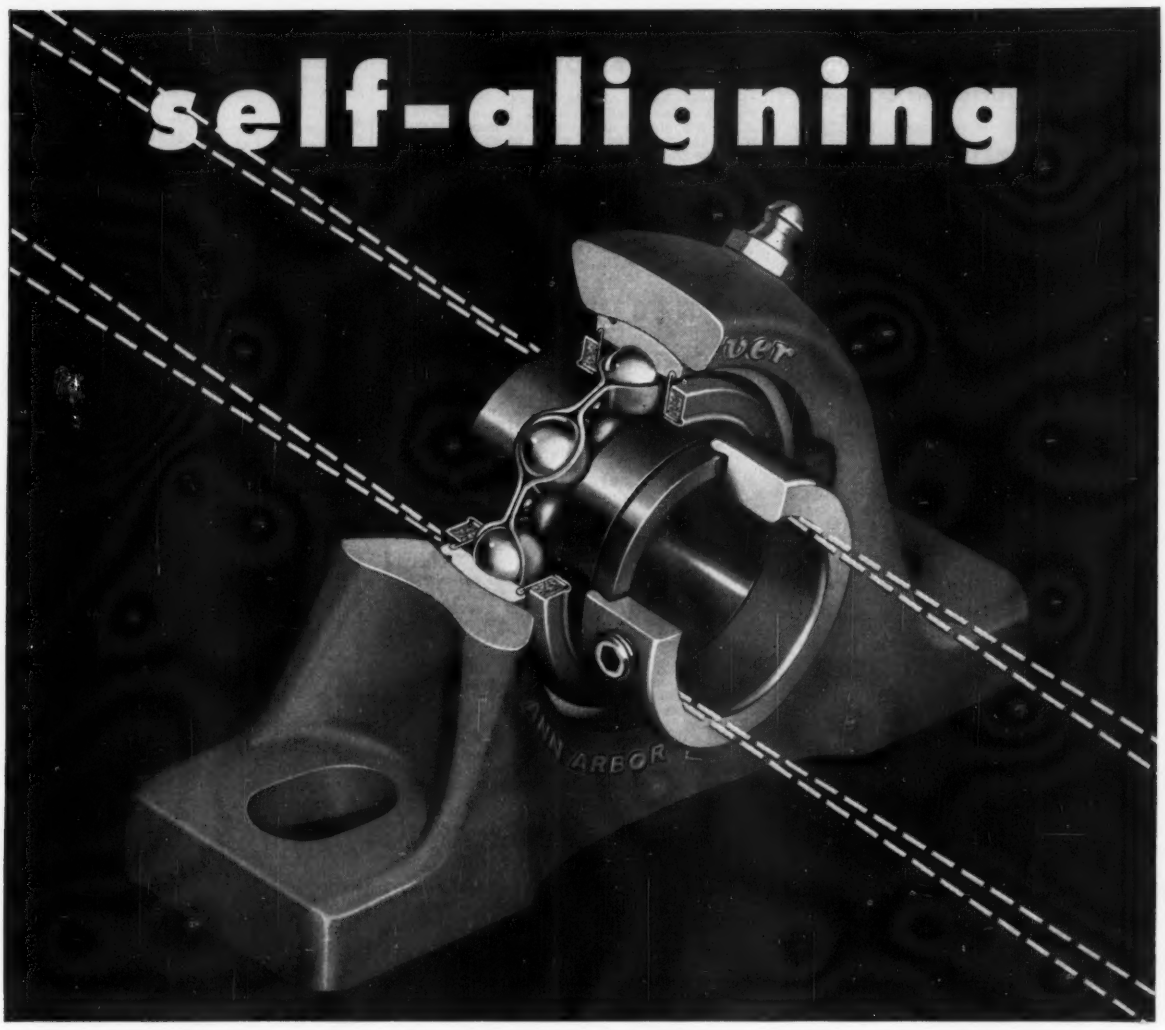
Justice's move came as a surprise to many metalmen since Aluminium has no production facilities in this country. The company normally exports about 200,000 tons of primary metal to the U. S. a year. Apex is a major custom smelter with yearly capacity of around 90,000 tons.

In the Markets

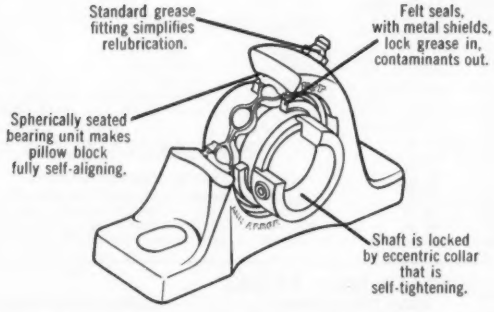
• **Copper Outlook Still Hazy**—The political stability of the Belgian Congo after it receives its independence on July 1 will probably determine the strength of the custom smelter copper price. Orders for July shipments are being priced at 33 cents a pound. But the mediocre level of business being conducted probably couldn't sustain this quotation for August delivery unless Congo production were curtailed or cut off by riots and work stoppages, a not too unlikely prospect.

• **Zinc Market Slumbering**—May shipments of slab zinc dropped to 62,039 tons, the lowest month since last September (see chart), reports the American Zinc Institute Inc. Even a 4000 ton drop in production (to 79,216 tons) due to the strike that has closed down Bunker Hill properties, couldn't close the gap caused by sharply reduced demand. Result: Stocks jumped over 17,000 tons to 165,038 tons. June is bringing no improvement. When the final tally for the month is in, metalmen expect: Shipments to be about the same, a little less production as the first four months of the Bunker Hill strike are felt, and higher stocks. Prices should hold.

self-aligning



hoover quality PILLOW BLOCK BALL BEARINGS


Standard grease fitting simplifies relubrication.
Felt seals, with metal shields, lock grease in, contaminants out.
Spherically seated bearing unit makes pillow block fully self-aligning.
Shaft is locked by eccentric collar that is self-tightening.

Simplify bearing application problems caused by inaccuracies of assembly or machining of equipment. Use *Hoover Quality* SP series pillow block ball bearings that adjust automatically to shaft misalignment in any direction.

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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 26.00; ingots, 28.10, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.60; No. 43, 25.90; No. 195, 30.70; No. 214, 31.50; No. 356, 26.30, 30 lb ingots; 10 lb ingots, add 0.4 cent per lb; 6 lb ingots, add 0.6 cent per lb.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.00-26.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.
Cadmium: Sticks and bars, $1.50 per lb deld.
Cobalt: 99+%, $1.50 per lb for 500-lb keg, $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55-85 per lb nom.
Copper: Electrolytic, 33.00 deld.; custom smelters, 33.00; lake, 33.00 deld.; fire refined, 32.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $75-80 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb f.o.b. Minneapolis; 24-99 lb, $9.50; 100-449 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $213-215 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-7.0 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.
Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.
Selenium: $7 per lb, commercial grade.
Silver: Open market, 91.375 per troy oz.
Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.
Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.
Tellurium: $3.50 per lb, 100 lb or more.
Thallium: $7.50 per lb.
Tin: Straits, N. Y., spot, and prompt, 101.375.
Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.
Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.50-4.25.
Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 14.50; special high grade, 14.75 deld. Diecasting alloy ingot No. 3, 16.25; No. 2, 16.75; No. 5, 16.50 deld.
Zirconium: Reactor grade sponge, 100 lb or less, $8 per lb; 100-500 lb, $7 per lb; over 500 lb, $6.50 per lb.
(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 26.25-28.00; No. 12 foundry alloy (No. 2 grade), 23.75-25.00; 5% silicon alloy, 0.60 Cu max., 25.00-25.25; 13 alloy, 0.60 Cu max., 25.00-25.25; 195 alloy, 26.75-27.75; 108 alloy, 24.25-25.50. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.00; grade 2, 23.75; grade 3, 22.75; grade 4, 22.25.

Brass Ingot: Red brass, No. 115, 29.25; tin bronze, No. 225, 39.50; No. 245, 34.00; high-leaded tin bronze, No. 305, 33.75; No. 1 yellow, No. 405, 23.75; manganese bronze, No. 421, 28.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.975, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.96. Weatherproof, 20,000-lb lots, 38.55; l.c.l., 39.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	106	128
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Widths (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.10-47.70
0.136-0.096	24-72	72-180	45.50-48.70
0.096-0.077	24-72	72-180	46.20-50.00
0.077-0.068	24-72	72-180	46.70-51.70
0.068-0.061	24-72	72-180	46.70-55.50
0.061-0.048	24-72	72-180	47.30-57.30
0.048-0.038	24-72	72-180	47.30-60.20
0.038-0.030	24-72	72-180	48.20-65.30
0.030-0.024	24-60	72-180	48.70-56.60
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-36	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	44.60	49.40
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base, 12 ft

Diam. (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	72.90	75.80	....	....
0.188	....	....	....	78.20
0.250	58.00	61.60	70.70	72.30
0.375	57.20	62.40	69.00	70.50
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	57.20	62.40	69.00	70.50
0.625	57.20	62.40	65.80	66.60
0.750	55.70	60.70	59.60	62.60
0.875	55.70	60.70	59.60	62.60
1.000	55.70	60.70	59.60	62.60
1.125	53.30	58.30	57.50	60.40
1.250	53.30	58.30	57.50	60.40
1.375	53.30	58.30	57.50	60.40
1.500	53.30	58.30	57.50	60.40
1.625	51.00	55.60	....	58.20
1.750	51.00	55.60	56.30	58.20
1.875	51.00	55.60	....	58.20
2.000	51.00	55.60	56.30	58.20
2.250	49.50	54.00	....	58.20
2.500	49.50	54.00	....	58.20
2.750	47.90	52.20	....	58.20
3.000	47.90	52.20	....	58.20
3.250	....	52.20	....	....
3.375	....	52.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.20-56.90; 6061, 43.20-56.90; 7075, 61.50-71.20; 7079, 66.50-76.20.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 31.55; 1¼ in., 42.75; 1½ in., 51.05; 2 in., 61.70; 3 in., 123.40; 4 in., 169.55; 5 in., 229.60; 6 in., 304.60; 8 in., 458.40; 10 in., 706.45 (3-24 ft lengths).

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	44.70-46.20	53.20-59.00
15-17	44.70-46.20	55.60-60.80
18-23	45.20-46.80	57.70-66.40
24-32	45.20-46.80	65.60-78.80
33-38	48.80-51.40	82.30-93.40
39-44	58.70-62.40	99.90-121.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 106.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	94.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.00-23.50; No. 2 heavy copper and wire, 20.00-20.50; light copper, 18.00-18.50; No. 1 composition red brass, 17.00-17.25; No. 1 com-

BRASS MILL PRICES

MILL PRODUCTS a

	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper	50.00b	54.86c	....	58.32
Yellow Brass	50.57	36.06d	50.86	54.23
Low Brass, 80%	53.53	53.22	53.82	57.09
Red Brass, 85%	54.58	54.27	54.87	58.14
Com. Bronze, 90%	56.17	55.86	56.46	59.48
Manganese Bronze	58.86	52.21	62.69	....
Muntz Metal	53.20	48.26	....	....
Naval Brass	55.12	48.68	61.43	58.78
Silicon Bronze	62.86	61.80	62.15	80.79
Nickel Silver, 10%	65.98	68.06	68.06	....
Phos. Bronze	77.44	78.19	77.69	79.37

SCRAP ALLOWANCES e (Based on copper at 30.00c)

Clean Heavy	Rod Ends	Clean Turnings
29.000	29.000	28.250
22.250	21.250	20.250
24.750	24.500	24.000
25.750	25.500	25.000
26.750	26.500	26.000
20.875	26.625	19.875
20.875	20.625	20.125
20.750	20.500	20.000
28.375	28.125	27.375
26.875	26.625	14.937
29.875	29.625	28.625

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 15.50-15.75; new brass clippings, 14.00-14.50; light brass, 10.50-10.75; heavy yellow brass, 11.50-11.75; new brass rod ends, 12.50-12.75; auto radiators, unsweated, 12.50-12.75; cocks and faucets, 13.50-14.00; brass pipe, 14.00-14.50.

Lead: Soft scrap lead, 8.00-8.25; battery plates, 3.00-3.25; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.50-10.00.

Monel: Clippings, 24.00-25.00; old sheets, 22.00-23.00; turnings, 19.00-20.00; rods, 24.00-25.00.

Nickel: Sheets and clips, 50.00-51.00; rolled anodes, 50.00-51.00; turnings, 39.00-41.00; rod ends, 50.00-51.00.

Zinc: Old zinc, 4.00-4.50; new diecast scrap, 4.00-4.50; old diecast scrap, 2.00-2.25.

Aluminum: Old castings and sheets, 10.50-11.00; clean borings and turnings, 6.50-7.00; segregated low copper clips, 14.00-14.50; segregated high copper clips, 13.00-13.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 12.00-12.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 11.00-11.50; clean borings and turnings, 8.00-8.50; segregated low copper clips, 15.50-16.00; segregated high copper clips, 14.00-14.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 13.50-14.00.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.00-11.25; clean borings and turnings, 9.50-10.00; segregated low copper clips, 14.75-15.00; segregated high copper clips, 14.00-14.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 13.50-14.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 59.00; light scrap, 54.00; turnings and borings, 39.00.

Copper and Brass: No. 1 heavy copper and wire, 26.75; No. 2 heavy copper and wire, 23.75; light copper, 21.50; refinery brass (60% copper) dry copper content, 22.25.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 26.75; No. 2 heavy copper and wire, 23.75; light copper, 21.50; No. 1 composition borings, 19.75; No. 1 composition solids, 20.25; heavy yellow brass solids, 15.00; yellow brass turnings, 14.00; radiators, 16.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.50.

Copper: Flat-rolled, 50.04; oval, 46.50, 5000-10,000 lb, electrodeposited, 42.00, 2000-5000 lb lots; cast, 44.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 1000 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 119.50; 200-499 lb, 118.00; 500-999 lb, 117.50; 1000 lb or more, 117.00.

Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.50 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,0000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 16.00; 2000-5900 lb, 14.00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23,000 lb or more, 13.00.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 79.10; 100-600 lb, 69.70; 700-1900 lb, 67.00; 2000-9900 lb, 65.10; 10,000 lb or more, 63.80.

Stannous Chloride (Anhydrous): 25 lb, 154.40; 100 lb, 149.50; 400 lb, 147.10; 800-19,900 lb, 106.20; 20,000 lb or more, 100.10.

Stannous Sulphate: Less than 50 lb, 139.60; 50 lb, 109.60; 100-1900 lb, 107.60; 2000 lb or more, 105.60.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 159)

somewhat more promising than it was, though current sales are light due to reduced steelmaking operations.

• **Portland, Oreg.** — Scrap prices, generally, are on a par with those quoted at Seattle, but some items are influenced by local conditions. Mill buying is limited and not much material is coming to district yards. The usual summer letdown in steelmaking requirements will further depress the market. Two full cargoes are scheduled for shipment to Japan this month.

Plates . . .

Plate Prices, Page 149

Prospects for an early pickup in activity in the plate market are not promising. Demand is holding at a low level. Sheared plates are available in two to three weeks, specialties (including alloy plate) in four to seven weeks.

Several platemakers are planning shutdowns for mass vacations next month. One Eastern mill is scheduled to go down June 25 for two weeks.

The outlook for a pickup in ship requirements has been brightened by the closing of bids by the Maritime Commission June 17 on merchant ships for Lykes Bros. However, shipwork continues to be hard hit by the strike at eight East Coast yards of the Bethlehem Steel Co. Also, the Shipbuilding Council of America reports a general lag—there were only 60 shipbuilding contracts on hand in American yards as of June 1, representing 950,000 tons of merchant shipping.

Buying by the Naval shipyards this quarter compares favorably with that in the first three months of the year. A slight decline is indicated for the third quarter. Submarine construction has increased the ratio of high tensile steel used.

Shipyards in general are drawing on their steel inventories, as are the weldment and tank shops. Some tankmakers built up stocks of finished tanks last spring and have not yet disposed of them.

Structural Shapes . . .

Structural Shape Prices, Page 149

Seasonal improvement in construction is reflected in a slight pickup in demand for structural steel. But business is still far from brisk, and fabricators are continuing to draw on their backlogs.

Competition is keen. Contractors

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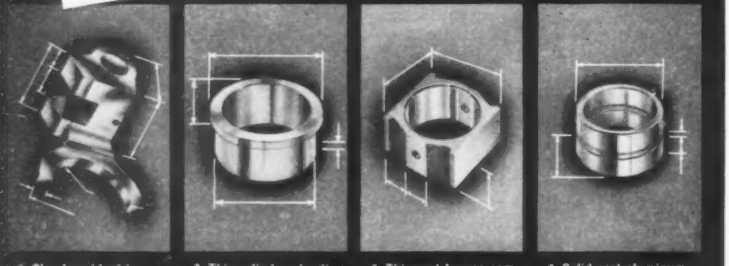
...case in point*



*Clearly evident is the economy in the production of this shifter fork by Bunting Powder Metallurgy. The elimination of practically all machine work effects striking cost reduction.

*This cylinder gland bearing made of Bunting Bearing Aluminum is an example of how to save weight and money on the cost of large, thick-wall bearings and parts.

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*Solid cast aluminum gear bearing to replace roller bearing for longer life and lower cost.

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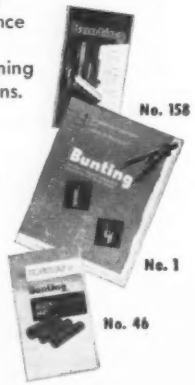
No. 46 Technology of Bunting Bearing Aluminum—A technical treatise on the composition of and machining Bunting Bearing Aluminum Bar Stock.



The BUNTING Brass and Bronze Company
Toledo 1, Ohio, Phone EVergreen 2-3451

are bidding well under engineers' estimates on fabricated structural steel, notably bridge tonnage. Buyers are playing one structural shop against another, thus forcing additional concessions for steel in place. That is especially true of jobs running 400 tons and less. Price cutting is principally among the smaller fabricators. Most of them have depleted their backlogs and are anxious to book new orders.

More bridge volume is being estimated in New England. However, fabricators are not adding to their steel inventories with standard shapes and wide flange sections available for delivery in three to five weeks.

Several sizable tonnages are pending in the Pacific Northwest, including 950 tons for a Montana State bridge, 400 tons for an Oregon State bridge, 300 tons for a hospital at Anchorage, Alaska, and 300 tons for several bridges in Alaska.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

543 tons, Bishop Kearney High School, Brooklyn, N. Y., through Caristo Construction Co., general contractor, to Lehigh Structural Steel Co., Allentown, Pa.

485 tons, angles, Navy, General Stores Supply Office, Philadelphia, to C. Itoh & Co. (America) Inc., New York.

210 tons, addition, chemical plant, General Electric Co., Cleveland, to Republic Structural Iron Works, Cleveland.

STRUCTURAL STEEL PENDING

8000 tons, missile complex facilities, U. S. Army Engineers, Plattsburg, N. Y.; Raymond International Inc., 140 Cedar St., New York, low on the general contract.

7000 tons, stadium, District of Columbia; McCloskey & Co., Philadelphia, awarded the general contract.

6000 tons, 29-story office building, 250 Broadway, New York; Sam Miskoff & Sons, builders; Emery Roth & Sons, architect.

3225 tons, superstructure, bridge, Tennessee River, Natchez Trace Highway, Colbert-Lauderdale counties, Alabama; bids June 27.

3860 tons, American River span, Sault Ste. Marie, Mich., bids closed June 14; D. B. Steinman, New York, engineer.

2017 tons (government-furnished), 22.3 mile transmission power line, Clackmas County, Oregon, 101 towers involved; Charles T. Parker Construction Co., Portland, Oreg., is low at $545,065 to the Bonneville Power Administration, Portland.

1095 tons, seven state highway bridges, New Britain-Berlin, Conn.; also 650 tons, concrete reinforcing bars, and 485 tons of steel piling. Bureau of Public Roads, Arlington, Va.

1000 tons, factory, Garden State Paper Co., Garfield, N. J., Joseph Mucarelle, general contractor.

REINFORCING BARS . . .

REINFORCING BARS PLACED

925 tons, 14,200 ft of 30 in. pipe for Hackensack Water Co., Closter, N. J., to Lock Joint Pipe Co., East Orange, N. J.

415 tons, women's dormitory, Washington State College, Pullman, Wash., to Pacific Coast Div., Bethlehem Steel Co., Seattle; Johnson-Busboom-Rauh Co., Spokane, Wash., general contractor.

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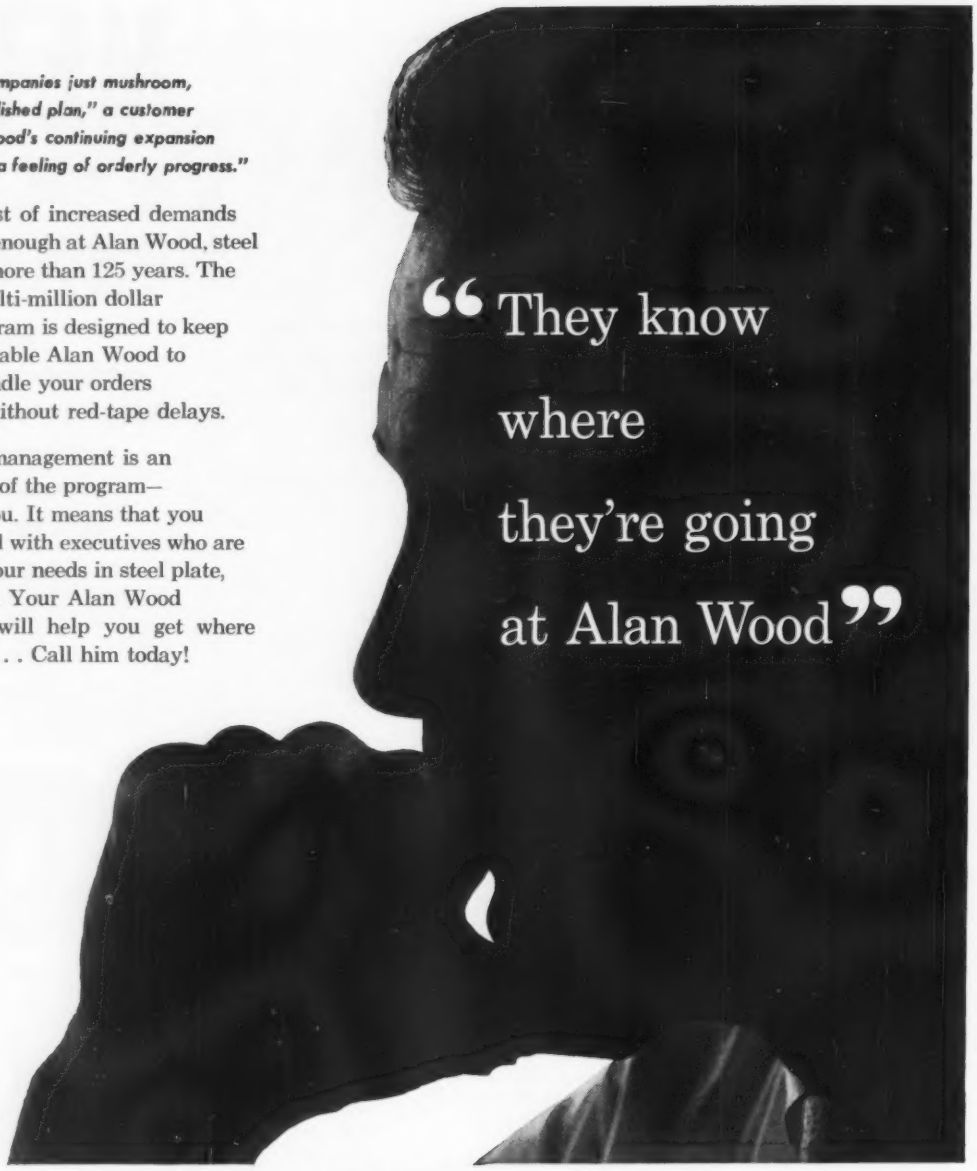

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